LAKE HOOD SEAPLANE BASE
MASTER PLAN UPDATE

Final Report

September 2017

DOWL in
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LAKE HOOD SEAPLANE BASE

MASTER PLAN UPDATE

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LIST OF ACRONYMS

AAC ..... Aircraft Approach Category
AAGR ..... Average Annual Growth Rate
AC ..... Advisory Circular
ADG ..... Airplane Design Group
ADF&G ..... State of Alaska Department of Fish and Game
AGL ..... Above Ground Level
AIAS ..... Alaska International Airport System
AIP ..... Airport Improvement Program
ALP ..... Airport Layout Plan
ANC ..... Ted Stevens Anchorage International Airport (Airport Code)
ASOS ..... Automated Surface Observing System
ATADS ..... Air Traffic Activity Data System
ATC ..... Air Traffic Control
ATCT ..... Airport Traffic Control Tower
ATIS ..... Automated Terminal Information Service
BRL ..... Building Restriction Line
CCTV ..... Closed Circuit Television
CEQ ..... Council on Environmental Equality
CIP ..... Capital Improvement Program
CO ..... Carbon Monoxide
dB ..... Decibel
DEC ..... State of Alaska Department of Environmental Conservation
DNL ..... Day-Night Equivalent Sound Level
DO ..... Dissolved Oxygen
DOT&PF ..... Alaska Department of Transportation and Public Facilities
EIS ..... Environmental Impact Statement
EPA ..... Environmental Protection Agency
FAA ..... Federal Aviation Administration
FAI ..... Fairbanks International Airport (Airport Code)
FBO ..... Fixed Base Operator
FEMA ..... Federal Emergency Management Agency
GA ..... General Aviation
GHG ..... greenhouse gases
IFR ..... Instrument Flight Rules
JBER ..... Joint Base Elmendorf-Richardson
LHD ..... Lake Hood Seaplane Base
MGW ..... Main Gear Width
MIRL ..... Medium Intensity Runway Lights
MOA ..... Municipality of Anchorage
MRI ..... Merrill Field
MSA ..... Metropolitan Statistical Area
MSL ..... Mean Sea Level
NAS ..... National Air System
NEPA ..... National Environmental Policy Act
NHPA ..... National Historic Preservation Act
NOTAM ..... Notice to Airmen
OFA ..... Obstacle Free Area
PCPI ..... Per Capita Personal Income
RPZ ..... Runway Protection Zones
RVZ ..... Runway Visibility Zone
SHPO ..... State Historic Preservation Office
SPB ..... Seaplane Base

TAF ..... Terminal Area Forecast
TDG..... Taxiway Design Group
TSA ..... Taxilane Safety Area
Uniform Act..... Uniform Relocation Assistance & Real Property Acquisition Policies Act of 1970
USACE..... U.S. Army Corps of Engineers
USFWS..... U.S. Fish and Wildlife Service
VFR ..... Visual Flight Rules
VMC..... Visual Meteorological Conditions

1.0 INTRODUCTION

This 2017 Lake Hood Seaplane Base (LHD) Master Plan, completed from 2014-2016, is an update to the 2006 LHD Master Plan. This 2017 LHD Master Plan will guide the orderly development of LHD over the next 20 years. The Master Plan was developed in accordance with the Federal Aviation Administration (FAA) Airport Master Plan Advisory Circular (AC 150/5070-6B) and Seaplane Base (SPB) Advisory Circular (AC 150/5395-1A).

1.1 Master Plan Definition, Purpose, Process

A master plan, as defined by the Federal Aviation Administration, is "a comprehensive study of an airport that usually describes the short-, medium-, and long-term development plans to meet future aviation demand." A master plan guides development of infrastructure built by the airport, the FAA, and airport tenants and users. A master plan does not resolve all of an airport's *management, maintenance, and operations* issues – instead its purpose, as the definition above explains, is to guide *development* of the airport.

Products of a master plan include the master plan report that describes the analytical process used to reach the recommended plan and an airport layout plan that graphically shows how airport improvements can be built according to FAA design standards.

Airport master plans help set development priorities and schedules. Airport development is usually recommended in a phased 20 year capital improvement program. The airport master plan and airport layout plan follow FAA planning and design standards to ensure the airport development occurs in a safe manner. Airport improvements must be included in an airport layout plan in order to be eligible for FAA funding.

The FAA recommends that airports update their master plan regularly; with the frequency dependent on how fast the airport is changing and growing. That last LHD Master Plan was published in 2006 and the master plan before that was completed in 1996.

Master plans follow a systematic and sequential process which corresponds to the chapters of this report. This includes:

1. Inventory of existing conditions, facilities, and issues;
2. Forecast of future activity;
3. Identification of facility requirements/needs;
4. Airport development alternatives and recommended plan; and
5. Implementation.

Issues, needs, alternatives, and recommendations of a master plan are heavily influenced by the input of a wide array of airport users and stakeholders. The Lake Hood Master Plan had formal and informal methods of providing user/stakeholder input. In brief, they included:

- User interviews
- Surveys
- Presentations at stakeholder meetings - Lake Hood Pilots Association, Alaska Airmen's Association, Lake Hood User Meetings, Community Councils
- Advisory Committee (5 meetings)
- Public meetings (3 meetings) which were also available with live streaming on the project website.

Public Meeting #3 Presentation

Public Meeting #3 with View of the Live Streaming Camera

1.2 Master Plan Goals, and Objectives

The following set of goals and objectives guided the LHD Master Plan process.

- **Safety:** Maintain a safe and secure operating environment.
  - Provide safe facilities for pedestrians, vehicles, and aircraft.
  - Comply with FAA design standards when practicable.
  - Enhance security for tenants, users, and the public.
  - Maintain safe aircraft operating surfaces.
- **Efficiency:** Maintain or enhance the efficiency and effectiveness of LHD's operations.
  - Maintain the capacity of existing runway and waterlanes.
  - Accommodate forecasted slip, tie down, and lease lot demand, as practicable.
  - Develop facilities that improve the efficiency and reduce costs of airport maintenance.
- **Environmental Awareness:** Operate and develop LHD in a way that minimizes negative environmental impacts.
  - Consider the noise sensitivity of nearby neighborhoods and minimize noise impacts through the careful siting of LHD operations that may generate noise.
  - Recognize the importance of non-aviation recreational use to the community.
  - Consider recommendations of other local plans.
- **Fiscal Sustainability:** Enhance the longer-term fiscal sustainability of LHD.
  - Consider LHD's role as an economic asset and enhance its ability to promote economic growth.
  - Enhance LHD's ability to generate additional revenues to become more self-sufficient.

- **Land Management:** Facilitate longer-term LHD development through strategic land management planning.
  - Promote the highest and best use of LHD property to best serve aviation.
  - Provide flexibility for future development.
  - Maximize use of existing facilities at Anchorage International, where appropriate.
- **Communication:** Engage stakeholders through open communication.
  - Encourage participation from all stakeholders.
  - Ensure that LHD's positive impacts on the community are communicated.
  - Respond to stakeholder comments.

2.0 INVENTORY

2.1 Background

2.1.1 Regional Setting

LHD is located within the Municipality of Anchorage (MOA) approximately 3 miles southwest of downtown Anchorage. With a 2015 population of over 300,000, Anchorage has about 40% of Alaska's population and is Alaska's hub for transportation, commerce and services. The MOA encompasses nearly 2,000 square miles of mostly rugged mountainous terrain, stretching from Eklutna at the north to Portage at the south. The Anchorage Bowl, where LHD and most of the Anchorage's population reside, is a relatively flat 100 square mile area with mountains to the east and ocean waters to the west, north and south.

The Turnagain and Spenard residential neighborhoods are north and east of LHD while Anchorage International Airport borders LHD to the south and west. The Spenard Road corridor is a commercial corridor that extends from the east of LHD almost to downtown Anchorage. Hotels, restaurants, and other businesses that serve LHD users and visitors are located within the corridor.

Other public airports in the Anchorage Bowl include Merrill Field (MRI), Joint Base Elmendorf-Richardson (JBER), and Bryant Army Airfield. Birchwood and Girdwood Airports are public general aviation airports north and south of the Anchorage Bowl. While LHD is the only public floatplane base in Anchorage, floatplanes can also be found at private residences on several lakes in Anchorage.

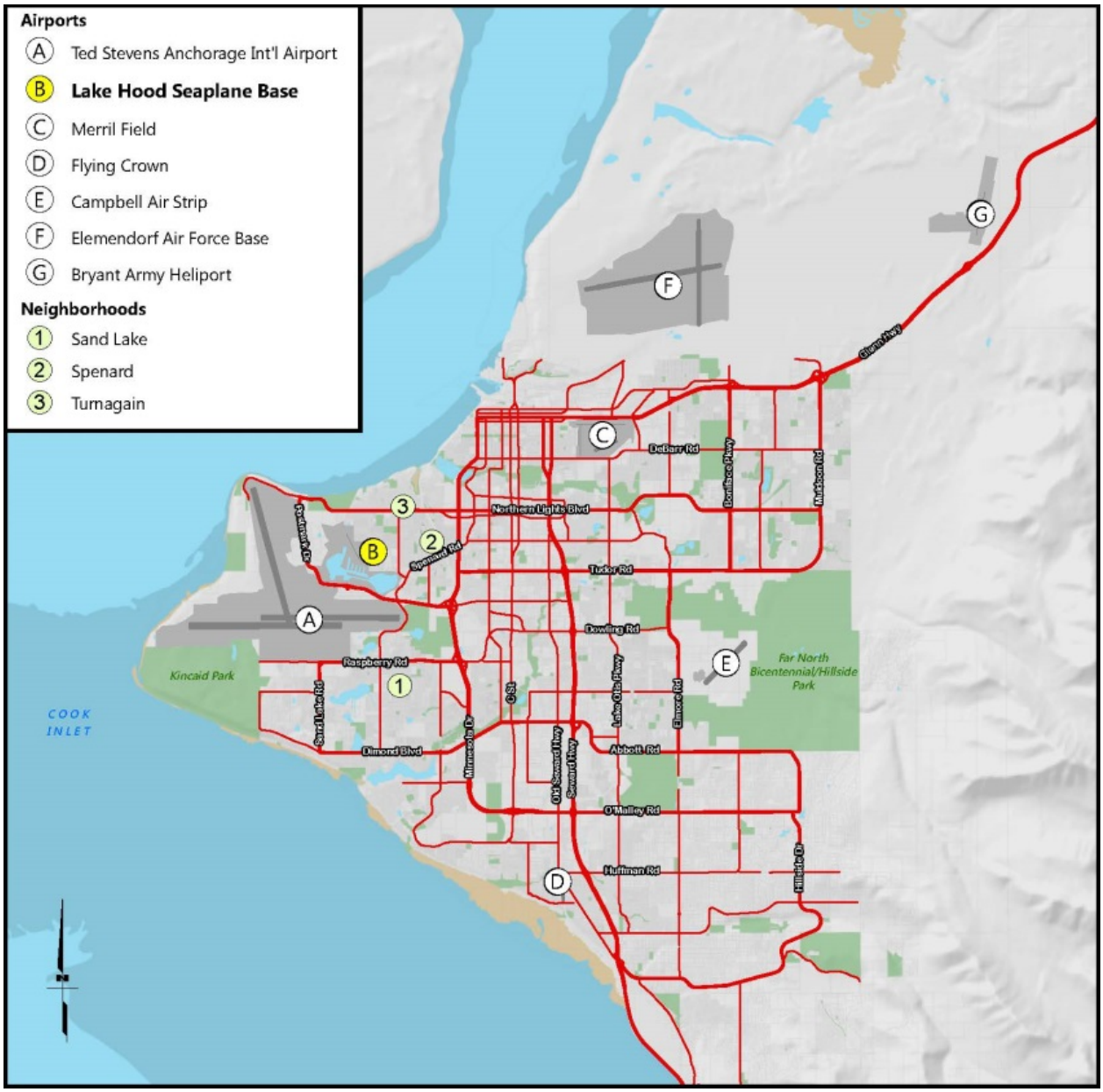

Figure 2-1a: Vicinity Map

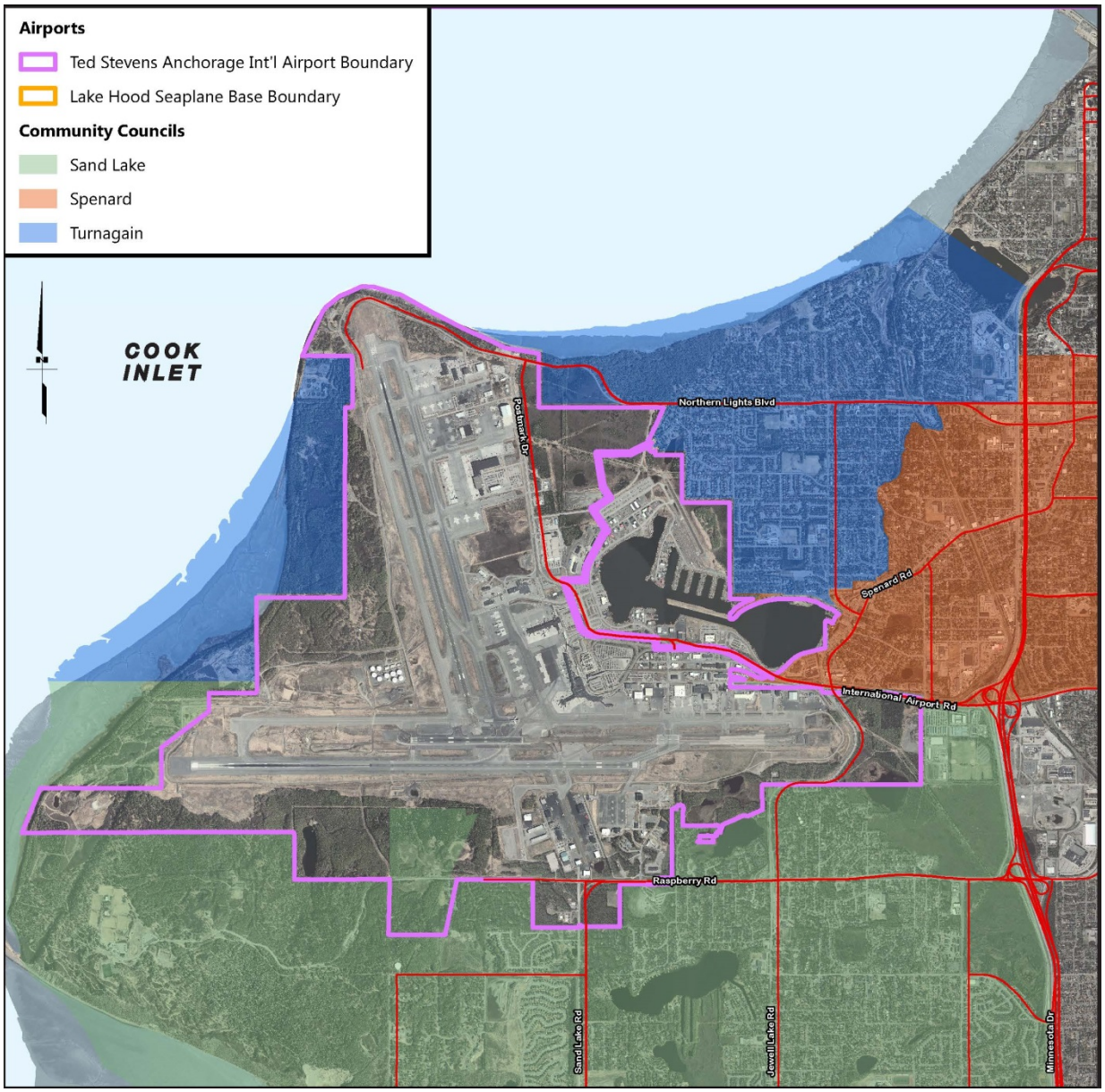

Figure 2-1b: Community Councils

2.1.2 Role

Only 18% of Alaska's communities are accessible by road, making aviation the lifeline to remote communities, and the only way to reach most remote recreation and resource development locations. Alaska has the largest aviation system in the nation – with over 700 registered airports and SPBs and hundreds more unregistered airstrips and water landing areas. LHD is the largest and busiest SPB in the world; the only public seaplane facility in Anchorage; and the only full service commercial seaplane facility in the south-central region of Alaska. LHD connects Anchorage residents and tourists to remote lodges, remote fishing and hunting locations and sightseeing venues, and also provides basic transportation to villages, resource development ventures, and other business activity in remote rural locations. Operations are particularly heavy in the summer and fall. Floatplanes use LHD in the ice-free months, ski equipped aircraft use LHD in the winter and wheeled aircraft use Runway 14-32 (Hood Strip) year-round. With over 10,000 annual enplanements and regularly scheduled flights, LHD is classified by the FAA as a Non-hub Primary Airport.

2.1.3 Economic Benefits

Lake Hood generates significant economic impacts for Anchorage and the region. According to a 2013 study of LHD economic impacts prepared by the McDowell Group[1], LHD accounted for 230 direct, indirect and induced jobs in 2012, with peak season employment of about 300 jobs. These jobs generated about $14 million in labor income, and $42 million in total economic activity. By comparison, LHD's economic impact is about equal to the Bethel Airport, an important rural aviation hub in western Alaska.

In addition, LHD's economic benefits extend to many off-site businesses and communities that rely on LHD flight services, including over 25 remote lodges, flightseeing, fishing/hunting, and other visitor activities, resource development activities, access to remote communities, and government services provided by air. Recreational pilots using LHD who purchase maintenance services, parts, and fuel; airport maintenance and operations; and capital expenditures add to the economic impacts of LHD.

[1] McDowell Group, Economic Benefits of Lake Hood Seaplane Base, September 2013.

2.1.4 Ownership, Management and Operations

Originally owned and developed by the federal government, LHD was transferred to the State of Alaska in 1959. LHD, together with Ted Stevens Anchorage International Airport (ANC) and Fairbanks International Airport (FAI), form the Alaska International Airport System (AIAS), a division within the State of Alaska, Department of Transportation and Public Facilities (DOT&PF).

Due to the close proximity to the ANC, LHD is organized, managed, operated, and maintained jointly with ANC. As such LHD benefits from the full spectrum of capabilities and resources of a major international hub, including 24/7 big airport operations, maintenance, snow removal, airport police, fire & rescue facilities, plus the range of management and staff functions within ANC & the AIAS. These assets are far beyond what would normally be available to a facility of LHD's size, while retaining the character and personalized attention of a small GA airport. LHD has a full time Airport Manager and a Leasing/Tie Down Officer who handle day-to-day management, administration and leasing and also support the operations, maintenance, planning and development efforts of other ANC staff.

As part of the AIAS, LHD's revenues and expenses are combined with ANC and FAI in the International Airport Revenue Fund. The International Airport Revenue Fund is an enterprise fund that is financially independent from State General Funds, and is funded from AIAS user fees.

2.1.5 Development History

LHD is comprised of two connected lakes: Lake Spenard and Lake Hood. Floatplanes have been using Lake Spenard since the 1930's. Since then, LHD has developed from a small, limited-use floatplane lake to the largest floatplane base in the world. A brief recap of major milestones in LHD's development history follows:

- 1940's - Lake Hood and Lake Spenard were joined by a single east-west channel and a 2,200 east-west gravel runway was constructed on the south side of the lakes.

- 1950's and 1960's - Additional floatplane slips and lease areas were developed, a perimeter road was built around the lakes, a taxiway connection was made between LHD and ANC, and an air traffic control tower was installed on the south side of Lake Spenard.

- 1970's - The gravel strip operation on the south side of Lake Spenard was closed and replaced with a new 2,200 foot north-south gravel airstrip and an adjacent gravel tie down area. An east/west slow taxi channel between Lake Hood and Lake Spenard was dredged, north of Gull Island, and the existing five floatplane slip/lease lot fingers were constructed. Many of the tie downs, slips and aviation lease areas in use today were constructed. The LHD air traffic control tower was decommissioned and air traffic control was transferred to the new control tower at ANC.

- 1980's – Additional lease areas were built north of Lake Hood and portions of tie down areas were reconfigured for International Airport Road, Postmark Drive and ANC terminal construction. LHD aircraft operations reached peak levels and floatplane slip demand grew considerably.

- 1990's and early 2000's – Existing facilities were upgraded and expanded. A separate road and taxiway were built along the south, west and north sides of Lake Hood; a water well was added to maintain adequate lake depth; paved gravel surfaces; installed railroad-type crossings where Taxilane V crosses Postmark Drive; constructed shoreline erosion control and edge-lighting along the east-west (E-W) waterlane; added sewer and water to lease areas; installed an aircraft wash rack; dredged and completed erosion control at slips; constructed Echo and Delta Parking; developed new lease lots north of Lake Hood; constructed a moose fence and a new snow dump north of Lake Hood; installed storm drain improvements to improve water quality; and expanded the runway safety area at Runway 14-32.

The previous LHD Master Plan was published in 2006. Since then, many of the development recommendations in the Capital Improvement Program (CIP) from that plan have been implemented as shown in the following table.

Table 2-1: 2006 LHD Master Plan CIP Projects Completed

2006 LHD Master Plan CIP Recommendations	Notes
Bank Stabilization - Phases I and II	Phases I and II Bank Stabilization - North shore of Lake Spenard and West side of Commercial Finger
New Pathway	Pathway improvements completed from Lions Club Park to International Airport Road
Pave Existing Gravel Parallel Taxiway	Resurfaced with recycled asphalt
Security/Fencing Study and Implementation	Fencing added east of Runway 14-32. Security camera system studied and cameras were installed
Land Acquisition – Runway 13 RPZ – Phases I and II	Property acquired and homes removed
Rehabilitate Alpha and Bravo Parking	Paving project completed in 2016
Land Acquisition - 3.24 Acres East of Spenard Lake	Portion of property has been acquired.

Figure 2-2 depicts many of the most recent improvements that were completed after the 1996 and 2006 Master Plans. In addition, the airport has completed many smaller improvements not shown here using operating budget funds and in-house staff.

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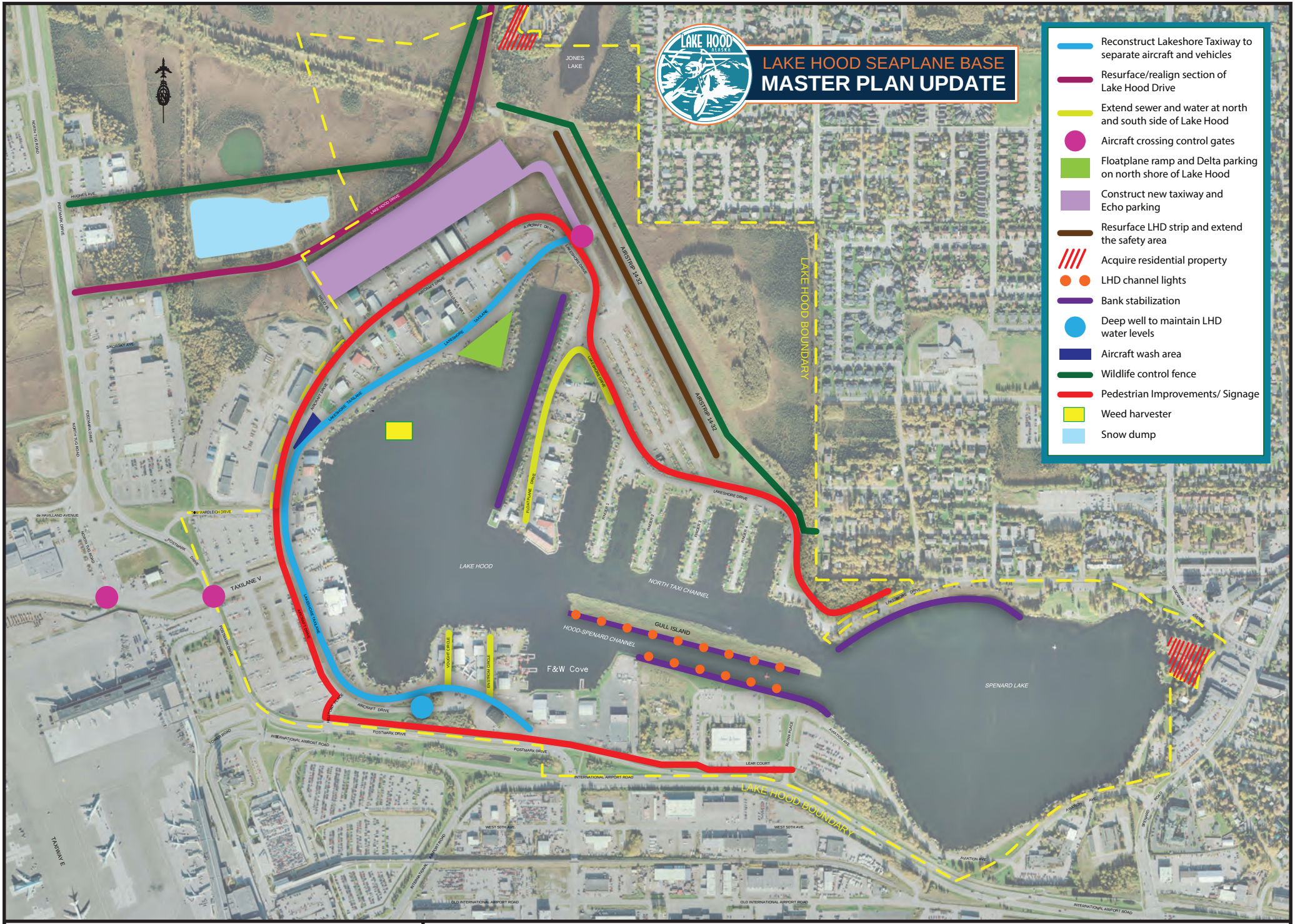

FIGURE 2-2
LHD IMPROVEMENTS COMPLETED AFTER THE 1996 AND 2006 MASTER PLANS

LAKE HOOD SEAPLANE BASE (LHD) MASTER PLAN
ANCHORAGE, ALASKA

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2.2 Facilities Overview

With over 352 airport-owned slips, and 486 airport-owned tie downs, and an estimated 61 lessee-managed slips, and 179 lessee-managed tie downs, and dozens of aviation businesses, LHD is the largest and busiest SPB in the world. LHD consists of three waterlanes located on Lakes Hood and Spenard and a gravel runway adjacent to and northeast of Lake Hood. Floatplanes operate on the waterlanes in the warmer months and planes equipped with skis operate on the lake ice during winter months. An east-west waterlane connecting Lake Hood and Lake Spenard serves as the primary landing/takeoff surface for floatplanes, with two lesser used waterlanes located in Lake Hood. Floatplane slips are spread around most of the perimeter of the lakes, along with dry dock floatplane parking at some of the paved and gravel parking areas.

Floatplane Slip in Lake Spenard

Aircraft equipped with wheels operate at Runway 14-32 (also known as Hood Strip), a 2,200-foot-long, 75-foot wide gravel surface runway. Gravel tie downs for wheeled aircraft are located next to Runway 14-32 and at Delta Parking on the north shore of Lake Hood, and paved parking is available at Alpha, Bravo, and Echo Parking on the west and north sides of Lake Hood. Additional paved general aviation tie downs are available at Charlie Parking on ANC.

LHD is connected to ANC by Taxilane V, a paved taxilane. Aircraft needing a longer or paved runway with instrument approaches and access to ANC services travel from LHD to ANC via Taxilane V. The following sections describe the LHD facilities in greater detail.

2.3 Airside Facilities

Airside and *Landside* are terms defined by the FAA to segregate different areas used at an airport. *Airside* usually refers to areas at an airport where aircraft and navigational aids can be found, such as runways, taxiways, aprons and hangars. *Landside* usually encompasses areas and facilities outside aircraft operating areas that are not accessible to aircraft. Landside areas are typically accessible to the general public and include areas such as roads, parking lots, unsecured portions of hangars and other buildings, and other public areas. Airport lease areas often have both airside and landside areas.

Some LHD areas have mixed airside and landside uses as they are aircraft operations areas but are also accessible to the general public. For the purposes of this master plan, airside will refer to Runway 14-32, taxiways and taxilanes, and water operating areas. Airside facilities of ANC are not included in this study, with the exception of the Taxilane V connection to LHD. Figures 2-3 and 2-4 depict the major airside facilities described in the following sections.

FIGURE 2-3
LHD RUNWAYS AND WATERLANES

LAKE HOOD SEAPLANE BASE (LHD) MASTER PLAN
ANCHORAGE, ALASKA

LEGEND
- WATERLANE
- RUNWAY

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2.3.1 Takeoff and Landing Surfaces

The takeoff and landing surfaces at LHD consist of one gravel runway and three waterlanes. The three unmarked waterlanes are located on Lakes Hood and Spenard and also serve as ski strips during winter operations when the lakes freeze and conditions permit.

Floatplanes primarily take off and land in the areas described as waterlanes in this report. However, because the waterlanes are not marked and floatplanes operate most effectively when oriented into the wind, pilots may operate floatplanes outside the waterlane dimensions described here. Also, during high north-south wind conditions floatplanes based on Lake Spenard sometimes land in a southern direction on Lake Spenard.

2.3.1.1 Runway 14-32

Runway 14-32 is the only permanent hard surface runway at LHD. It is located north of Lake Hood and is oriented southeast/northwest. The runway consists of a 2,200 foot long by 75 foot wide gravel surface with a single wheel weight bearing capacity of 9,000 pounds. The runway has no runway markings, but maintains threshold lights at both ends and medium intensity edge lights. The traffic pattern to Runway 14 is from the left and the traffic pattern to Runway 32 is from the right. Both ends currently maintain a 20:1 approach slope.

Prior to October 17, 2013, the gravel runway, Runway 14-32, maintained a separate Federal Aviation Administration (FAA) identifier (Z41) from the water takeoff and landing surfaces at LHD. The identifiers have since been consolidated, with Runway 14-32 being included as one of the runway surfaces at LHD. All airport information including Notices to Airmen (NOTAM), Automated Terminal Information Service (ATIS), weather, etc., is now found solely under the LHD identifier. The airport elevation is 79.93 feet above mean sea level (MSL). *Table 2-2* summarizes the major characteristics of LHD's runway and waterlanes.

2.3.1.2 E-W Waterlane

The East-West Waterlane (E-W Waterlane) is the longest of the water takeoff and landing surfaces at LHD. The 4,541 foot long by 188 foot wide waterlane connects Lakes Hood and Spenard, directly south of Gull Island. There are large areas for the maneuvering and turning around of seaplanes at each end of the waterlane, in Lakes Hood and Spenard. The waterlane does not have any visual markers, but does have a partial medium intensity edge lighting system controlled by the Airport Traffic Control Tower (ATCT) on the south shore of Gull Island and on part of the shoreline opposite of Gull Island. The E-W Waterlane ranges from 6 to 23 feet deep. Both ends currently maintain a 20:1 approach slope.

East-West Waterlane

2.3.1.3 N-S Waterlane

The North-South Waterlane (N-S Waterlane) consists of a 1,930 foot long by 200 foot wide area in Lake Hood. The south end of the waterlane is located in the south cove of Lake Hood. The north end of the waterlane begins south of Delta Parking and the North Ramp. The waterlane does not have any visual markers or lighting. The N-S Waterlane ranges from 6 to 21 feet deep. Both ends currently maintain a 20:1 approach slope.

2.3.1.4 NW-SE Waterlane

The Northwest-Southeast Waterlane (NW-SE Waterlane) consists of a 1,369 foot long by 150 foot wide area located in Lake Hood. This waterlane intersects both the E-W Waterlane and the

N-S Waterlane. The southeast end is oriented towards Fish and Wildlife Cove, while the northwest end is located near the midpoint of Lake Hood. The waterlane has turning basins on both ends for maneuvering and turning around of floatplanes, but the area in Fish and Wildlife Cove has more limited space. The waterlane does not have any visual markers or lighting. The NW-SE Waterlane ranges from 8 to 21 feet deep. Both ends currently maintain a 20:1 approach slope.

2.3.2 Winter Operations

During winter operations, as conditions permit, the three designated waterlanes at LHD become winter ski strips, capable of supporting operations of aircraft equipped with skis. The waterlanes are opened and groomed by airport staff when ice depth is safe and no overflow conditions exist.

Lake Hood Winter Skiplane Operations

Table 2-2: Takeoff and Landing Surface Characteristics

Item	Runway 14-32	E-W Waterlane	N-S Waterlane	NW-SE Waterlane
Surface	Gravel	Water/Ice	Water/Ice	Water/Ice
Dimensions (L x W)	2,200' x 75'	4,541' x 188'	1,930' x 200'	1,369' x 150'
Marking	None	None	None	None
Lighting	Threshold/MIRL	*Channel/MIRL	None	None
Traffic Pattern	Left-Right	Left- Left	Left- Left	Left- Left
Approach Slope	20:1	20:1	20:1	20:1

*partial

2.3.3 Taxiways, Taxilanes, and Taxi Channels

The network of taxiways, taxilanes, and taxi channels at LHD provides access between the takeoff and landing areas and landside facilities. As depicted in Figure 2-3, this network is both complex and somewhat unusual when compared with other SPBs and airports because select roads also serve as shared use roads for aircraft. Pathways provide a separate surface for pedestrians along some shared use roads. Aircraft have the right of way on shared use road surfaces, and Section 5 of the *Airport Operations Manual* requires that aircraft taxi with all available external and anti-collision lights on to reduce the risks of collision with other users.

Lake Hood Safety Sign

The following sections describe the land based and water based taxi network at LHD. Table 2-3 summarizes the taxiway, taxilane, and taxi channel major characteristics.

2.3.3.1 Taxiway H and Connectors

Taxiway H is a 25 foot wide, parallel taxiway that serves Runway 14-32. The taxiway is located on the west side of Runway 14-32. The taxiway centerline for the north portion of the taxiway is offset approximately 169 feet from the runway centerline. Where the taxiway meets Runway 14-32 tie downs, the taxiway shifts toward the runway and becomes an apron taxilane approximately 150 feet offset from the runway. Taxiway H provides access to Runway 14-32 via four connecting taxiways, H1 through H4 numbered from north to south.

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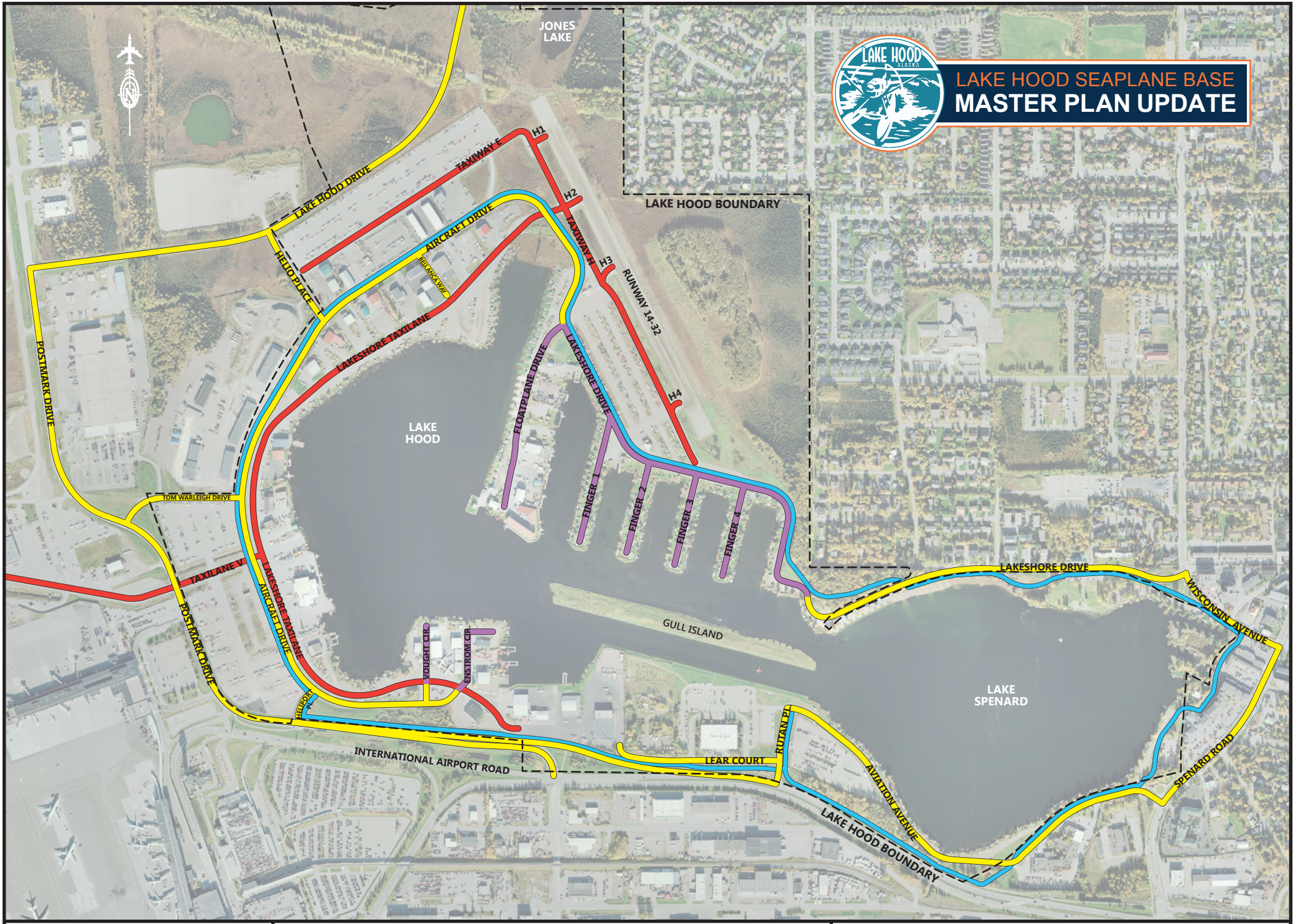

FIGURE 2-4
LHD TAXIWAYS, ROADS, AND PEDESTRIAN ROUTES

LAKE HOOD SEAPLANE BASE (LHD) MASTER PLAN
ANCHORAGE, ALASKA

LEGEND

- TAXIWAY/TAXILANE
- ROAD
- SHARED USE ROAD
- PEDESTRIAN ROUTES

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Taxiway H and Adjacent Gravel Tie Downs

Taxiway connectors H1 and H2, along with the section of parallel taxiway between them have a paved asphalt surface. Taxiway connectors H3 and H4 also have an asphalt surface; however the section of taxiway between them along the tie down apron is gravel. Taxiway H1 is approximately 25 feet wide while Taxiway H2 is approximately 69 feet wide, Taxiway H3 is approximately 63 feet wide, and Taxiway H4 is approximately 70 feet wide. Hold line markings are provided on taxiway connectors H1 through H4 approximately 125 feet from the Runway 14-32 centerline.

2.3.3.2 Taxiway E

Taxiway E is a 25 foot wide paved taxiway, running perpendicular to Taxiway H at its north end, and provides aircraft with access to Echo Parking and lease lots to the south of Echo Parking.

Taxiway E and Adjacent Tie Downs

2.3.3.3 Taxilane V

Taxilane V is a 50-foot-wide paved taxilane running west from Lakeshore Taxilane to ANC. Taxilane V provides LHD aircraft with access to ANC and to tie down areas Alpha, Bravo, and Charlie. Taxilane V is especially important for aircraft that need to use the longer paved runways and instrument approaches found at ANC. At its west end Taxilane V routes aircraft to Taxiway R at ANC, from which aircraft can access any of the runways at ANC. Taxilane V is classified as a taxilane at the request of the FAA Air Traffic Control Tower because it is uncontrolled and crosses several roads.

Taxilane V

2.3.3.4 Lakeshore Taxilane

Lakeshore Taxilane is a paved 25 foot wide taxilane that follows the north, west, and south sides of Lake Hood and extends from Taxiway H2 to the public and private hangars on the south shore of Lake Hood. The primary use of Lakeshore Taxilane is for the movement of aircraft between the aircraft lease lots and tie downs and takeoff and landing surfaces at LHD and ANC as well as to the north and west floatplane ramps at LHD. Vehicle traffic on Lakeshore Taxilane is limited to the minimum required for individuals to access their aircraft and businesses. Lakeshore Taxilane has two pilot controlled gates located directly west of Taxiway H2 that mitigate vehicle and pedestrian incursions at Runway 14-32.

Lakeshore Taxilane Gate at Intersection with Lakeshore Drive

2.3.3.5 Lakeshore Drive, Fingers, Enstrom Circle, Vought Circle (Shared Use Roads)

Lakeshore Drive extends from its intersection with Wisconsin Street on the northeast corner of Lake Spenard to the intersection with Lakeshore Taxilane and Aircraft Drive on the west side of Runway 14-32. A shared use segment of Lakeshore Drive is also used by aircraft that taxi between Runway 14-32 and slips and leases south of Runway 14-32; this shared use segment is shared by vehicles, pedestrians, and wheeled aircraft.

Lakeshore Drive

From Lakeshore Drive, wheeled aircraft have access to each of the five “fingers” located along the north side of Lake Hood. The "fingers" are a series of parallel peninsulas of land created by dredging water channels in the mid 1970’s to create more floatplane parking. The westernmost finger, known as the Commercial Finger, hosts aviation businesses conducting flightseeing, aircraft maintenance, and air taxi operations. The Commercial Finger is accessed by Floatplane Drive, a paved shared use road that allows vehicle and aircraft access to leases and permits on the finger. Lease and floatplane slip holders along Floatplane Drive must maintain an Obstacle Free Area (OFA) from the centerline of the road out 45 feet to allow safe taxiing of an aircraft with a wingspan up to 50 feet.

Floatplane Drive and Lease Lots on the Commercial Finger

Gravel Shared Use Road on a Finger

The remaining fingers to the east of the Commercial Finger primarily serve non-commercial private floatplane operators and are numbered two through five sequentially from west to east. Fingers two through five have gravel shared use roads that are shared by vehicles and aircraft, but are closed to pedestrians.

Finger Access Restrictions

Occasionally wheeled aircraft also taxi on Enstrom Circle and Vought Circle, two short paved roads on the south shore of Lake Hood. Leases and slips in this area are primarily oriented toward floatplanes and the Alaska Aviation Heritage Museum.

Enstrom Shared Use Road on the South Shore of Lake Hood

2.3.3.6 Taxi Channels

A taxi channel is a water channel used for the movement of seaplanes between the shoreline facilities and the waterlanes. In essence, taxi channels function as the taxiways in the water operating areas. At LHD, the primary taxi channel is an East-West Taxi Channel (Slow Taxi Channel) north of Gull Island, which runs parallel to the E-W Waterlane. This taxi channel varies in width from approximately 225 feet on the west to 175 feet to the east. Gull Island serves to block wakes from floatplanes using the E-W Waterlane and the E-W Taxi Channel from negatively impacting takeoff, landing, and taxi operations. From the E-W Taxi Channel, seaplanes can access each of the three designated waterlanes.

The E-W Taxi Channel also provides access to the five fingers located along the north side of Lake Hood. Each of these taxi channel inlets of the five fingers have a width that changes depending on the location of docks, shoreline and parked aircraft along their lengths, but their widths at their narrowest points range from between 165 feet to 185 feet as shown in the table below.

Table 2-3: Taxiways, Taxi Lanes, and Taxi Channels

Facility	Surface Type	Narrowest Width	Lighting
Taxiway H	Asphalt/Gravel	25’	Yes
Taxiway H1	Asphalt	25’	Yes
Taxiway H2	Asphalt	69’	Yes
Taxiway H3	Asphalt	63’	Yes
Taxiway H4	Asphalt	70’	Yes
Taxiway E	Asphalt	25’	Yes
Taxilane V	Asphalt	50’	Yes
Lakeshore Taxilane	Asphalt	25’	Limited
E-W Taxi Channel	Water	175’	None
Commercial Finger Channel	Water	165’	None
Finger Two Channel	Water	185’	None
Finger Three Channel	Water	165’	None
Finger Four Channel	Water	185’	None
Finger Five Channel	Water	185’	None

2.3.4 Airspace, Navigational Aids, Weather

2.3.4.1 Airspace

Safe separation of approaching and departing aircraft in the air is the responsibility of the FAA. The FAA regulates airspace by dividing the airspace into various classes, with each class having different separation standards and restrictions. To separate aircraft, the FAA has created a classification system of different types of airspace and related imaginary surfaces that can be depicted on charts that pilots use for flying both visually and under instrument conditions. In order to manage where aircraft are within these areas and what the pilot is doing, some of these imaginary airspaces are highly dependent upon Air Traffic Control (ATC) and radar control, while other areas are simply dependent upon the visual interpretation of the pilots and the basic instruments that they fly with, such as their compass and altimeter (see Figure 2-5).

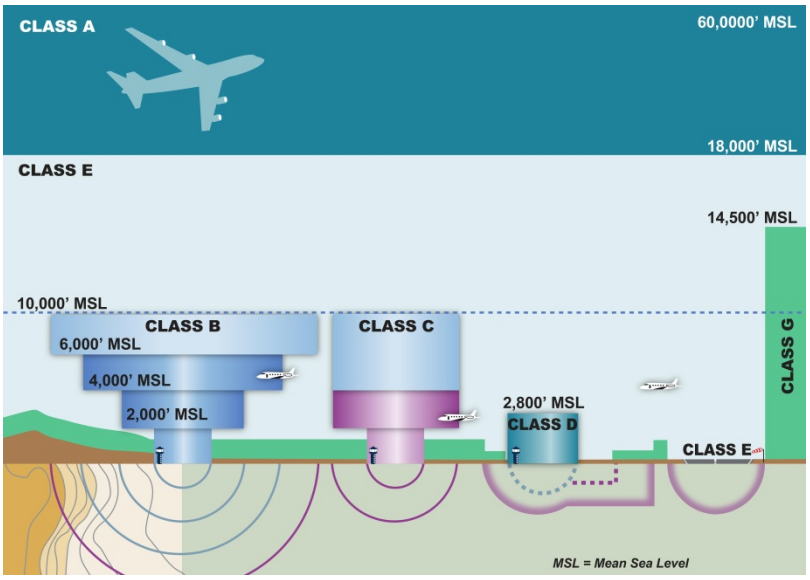

Figure 2-5: Airspace Map and Cross Sectional View

- **Class A** airspace encompasses the en route, high-altitude environment used by aircraft to transit from one area of the country to another. All aircraft in Class A airspace must operate under Instrument Flight Rules (IFR). This airspace exists within the United States from 18,000 feet MSL up to and including 60,000 feet MSL.
- **Class B** airspace is for aircraft flying under IFR and Visual Flight Rules (VFR) that are subject to positive control by ATC. Class B airspace exists at the high-density airports as a means of managing and regulating the flow of air traffic above, around and below the arrival and departure routes used by air carrier aircraft at major airports. Class B airspace includes all airspace from an airport's established elevation up to 10,000 feet MSL and out to a distance of 30 nautical miles, at varying altitudes.
- **Class C** airspace is defined around airports with air traffic control towers and radar approach control. Variations in shape are often made to accommodate other airports or terrain, but generally Class C airspace has two concentric circular areas with diameters of 10 and 20 nautical miles from the airport. Aircraft operating in Class C airspace must have specific radio and navigation equipment and must obtain clearance from ATC.

- **Class D** airspace normally extends from the surface of the airport up to 2,500 above ground level (AGL) and out at a distance of 5 nautical miles from the center of the airport. If the airport has an instrument approach, the airspace is also designed to encompass that as well. Class D airspace is under the jurisdiction of the local Air Traffic Control Tower (ATCT), with the purpose of sequencing arriving and departing traffic and direct aircraft on the ground in the immediate vicinity of the airport. Aircraft are required to maintain radio communication with the ATCT, and no separation services are provided to VFR aircraft.

- **Class E** airspace is considered the controlled airspace that is not Class A, B, C or D and is intended to provide air traffic service and adequate separation for IFR aircraft from other aircraft. The airspace generally exists from 700 or 1200 feet AGL to the bottom of Class A airspace at 18,000 MSL.

- **Class G** airspace is that airspace which is not already designated as Class A, B, C, D or E and is uncontrolled. Class G airspace lies between the surface and 700/1200 feet AGL and ATC does not have the authority or responsibility to manage air traffic within this airspace.

- **FAR Part 93 Airspace.** Title 14 - Chapter 1 - Subchapter F – Far Part 93 – Special Air Traffic Rules of the Code of Federal Regulations (CFR) is commonly referred to as FAR Part 93. This defines the rules and regulations for flying within a complex and high-density network of airports. CFR Part 93 Subpart D identifies specifically the airspace boundaries and segments between ANC, LHD/Z41, MRI and EDF as well as defining special air traffic rules and recommended VFR procedures. All this information is published in the FAA CFR and Airport Facility Directory.

2.3.4.1.1 Local Airspace

Ted Stevens Anchorage International Airport is centrally located in Anchorage's Class C airspace and contains multiple layers of special use airspace to separate GA, military and commercial traffic within the Anchorage Bowl (See Figure 2-6). LHD and MRI are classified as Class D airspace located within and below ANC's airspace. Due to the unique layout of the Anchorage

area airspace and close proximity to various airports within the city, LHD's airspace has special restrictions that are listed in the Anchorage VFR Terminal Area Chart and the FAA's Airport Facility Directory.

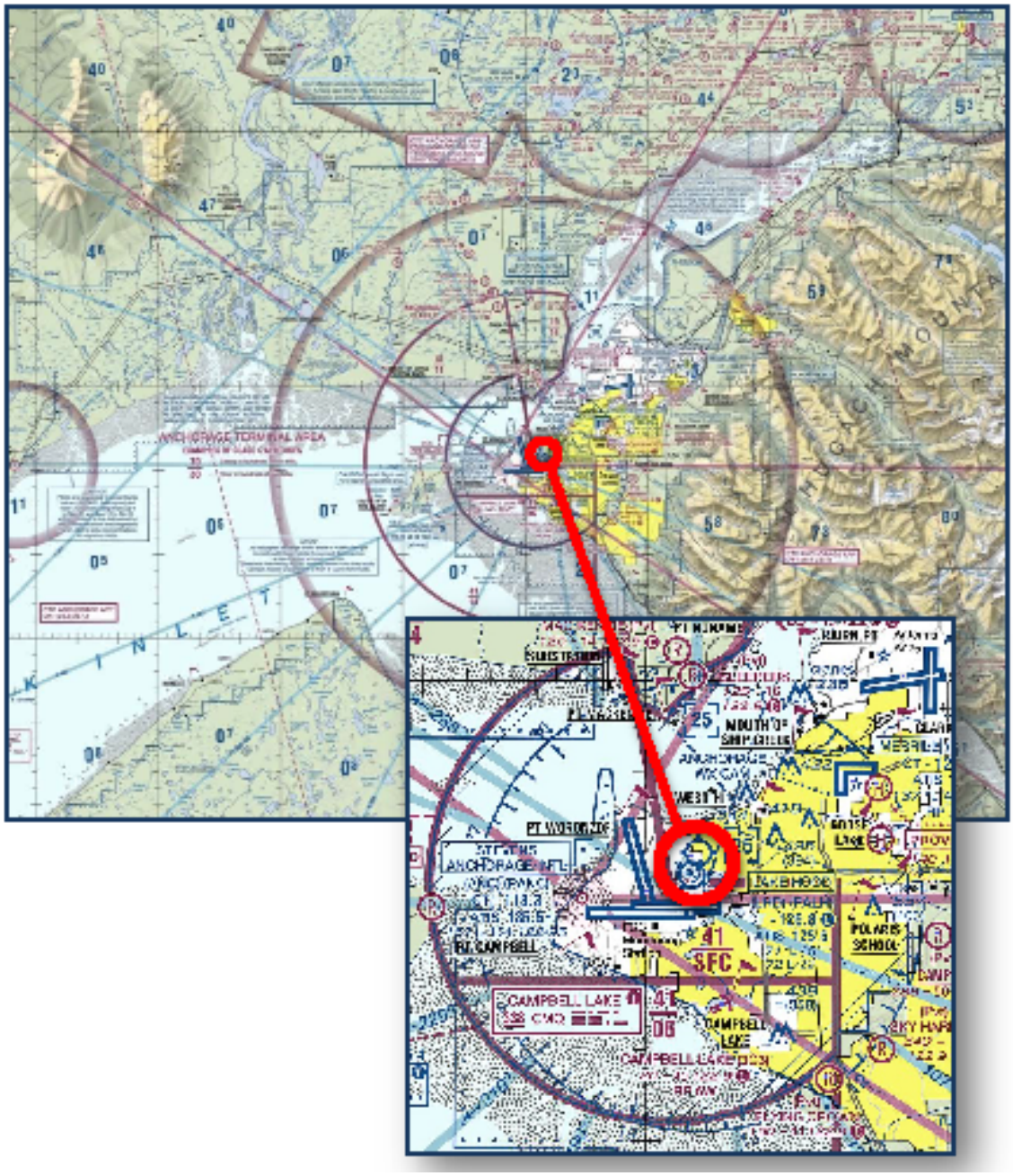

Figure 2-6: Lake Hood Seaplane Base – Anchorage Aeronautical Chart

2.3.4.1.2 Air Traffic

The FAA Air Traffic Control (ATC) facilities are classified into three parts: En Route, Terminal, and Flight Service Station (FSS). LHD is serviced by an Air Traffic Control Tower (ATCT), Air Route Traffic Control Center (ARTCC), a Terminal Radar Approach Control (TRACON), and a FSS. The combination of ATCT, ARTCC and TRACON facilities provide safety and separation to pilots flying under IFR and VFR. The FSS provides en route communications, lost-aircraft assistance and emergency services, pilot briefings, flight clearance relays and weather and navigational aid status information.

2.3.4.2 Navaids and Approaches

There is currently no instrument approach procedure directly associated with the LHD facility. The nearby ANC Airport has a large number of associated instrument approach procedures, standard arrival and departure routes, as well as terminal control radar. Pilots wishing to navigate to LHD under Instrument Meteorological Conditions (IMC) may do so under an IFR flight plan into ANC. Depending upon the weather in the vicinity of ANC, pilots may have the option of cancelling their Instrument Flight Rules (IFR) approach into ANC, if Visual Meteorological Conditions (VMC) exist, and navigate under Visual Flight Rules (VFR) into LHD. If weather conditions do not allow for a cancellation of this type, pilots can shoot an IFR approach into ANC, and then taxi to LHD after landing. All of these options require the pilot and aircraft to be appropriately rated and certified for IFR flight. The vast majority of flights beginning and terminating into and out of LHD are VFR in nature. The close proximity of ANC, other airports and LHD prevents approval for a stand-alone IFR procedure for LHD.

Neither the gravel airstrip nor the waterlanes at LHD use any type of standard visual navaid or approach slope guidance. LHD does not have a rotating beacon, apart from the beacon at ANC.

2.3.4.3 Weather, Winds, and Weather Reporting

The Anchorage area climate is considered transitional between maritime and continental climate zones, and receives an average of 16.6 inches of total precipitation measured as rain, of

which there are 74 inches of snow per year. Average temperatures in July range from 52 to 65 degrees Fahrenheit, and in January range from 11 to 23 degrees Fahrenheit.

Cloudy and overcast days rarely impact operations at LHD; VFR operations account for most of LHD's traffic. On average, cloudy conditions usually begin to steadily increase starting in late July, with the cloudiest month being December. Cloudy conditions don't usually start to reduce significantly until late February. Median cloud cover for the LHD area is 44% partly cloudy to 83% mostly cloudy. Due to its relatively high latitude, the amount of sunlight the area receives varies significantly between the summer and winter months, with nearly 19 hours in late June, compared to less than 6 hours in late December.

The majority of winds in the area are usually less than 13 mph, with an average yearly wind speed of 5 mph. The highest average wind speeds for the area usually occur in late May, and the lowest averages occur in late December. Prevailing wind direction for LHD is out of the north 21% of the time, with the second most common wind direction being from the south 15% of the time. The least common wind direction is from the east, at only 2% of the time.

With active volcanoes within less than 100 miles of Anchorage, ashfall is a significant, but infrequent hazard to aviation.

There are 2 main aviation related automatic weather reporting stations on or near LHD:

- The Automated Surface Observing System (ASOS) station located at LHD; and
- The ASOS station located at ANC.

2.3.4.3.1 Lighting and Marking

The LHD water lanes are not currently marked, with the exception of a portion of the edges of the E-W Waterlane. While LHD pilots generally land in the waterlanes depicted in Figure 2-3, they prefer the flexibility of landing into the wind and not being constrained by a marked waterlane. The most frequently used waterlane, the 4,540 foot E-W Waterlane, is most easily recognizable for pilots due to the large, straight channel bordered on the north by Gull Island and on the south by the channel shoreline. Medium intensity white lights mark the south bank

of Gull Island and the channel shoreline opposite Gull Island on the south side of the waterlane. The N-S water runway has a small, non-standard “S” runway marker located on the land to the north of its threshold. Numerous floodlights on buildings around the lake also help to orient pilots as to their position.

Runway 14-32 has a standard Medium Intensity Runway Lights (MIRL) system with accompanying threshold lights. The runway has no visible painted markings, due to its gravel surface. There are lighted windsocks located near the north end of Runway 14-32, and on the southeast side of the E-W Waterlane across from the DOT&PF Central Region building.

Most aprons and taxiways are marked with a combination of standard and non-standard markings and have standard blue retro reflective taxiway markers. Due to the need to manage a diverse mix of traffic from pedestrians, bicycles, vehicles, and aircraft around LHD roads/taxiways, various types of markings and signs can be found around the facility. The airport is working on a more consistent form of signage and marking of the non-airfield portions of LHD.

Lakeshore Drive Caution Sign

2.4 Landside Facilities

2.4.1 Lease Lots, Hangars, Services

There are approximately 50 active commercial leases on approximately 50 acres on LHD. Many of the commercial leaseholders offer aircraft parking and multi-unit commercial hangars under subleases.

Echo Parking Lease

Lake Hood Strip Lease

Other non-commercial users such as the Alaska Airmen Association, the Alaska Aviation Heritage Museum, Civil Air Patrol, State and Federal Agencies, and the Alaska Department of Transportation and Public Facilities Central Region offices also have hangars and/or offices on LHD. Figure 2-7 shows lease areas on LHD and Table 2-4 lists the names of tenants at LHD.

Alaska Aviation Heritage Museum

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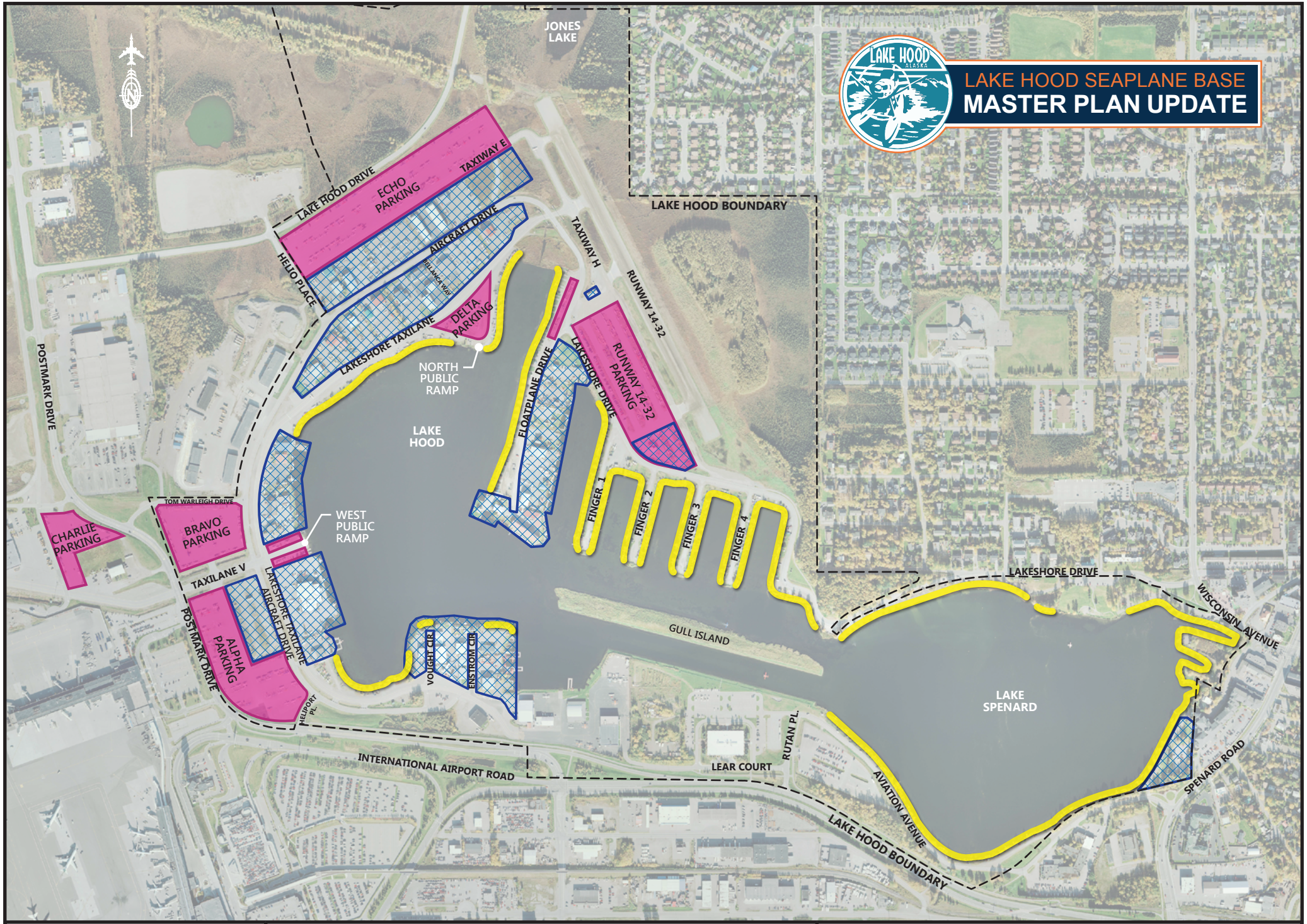

FIGURE 2-7
LHD FLOATPLANE SLIPS, TIE DOWNS, AND COMMERCIAL LEASES

LAKE HOOD SEAPLANE BASE (LHD) MASTER PLAN
ANCHORAGE, ALASKA

LEGEND
- COMMERCIAL LEASES
- FLOATPLANE SLIPS
- TIE DOWNS

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Table 2-4: LHD Leases, February 2017

Lease ADA #	TENANT NAME	PROPERTY BLOCK & LOT	LEASE TERM END	LEASE SQUARE FEET	LAND USE CLASS
31188	CPD ALASKA, LLC	BLOCK 17 LOT 15	4/30/17	3,250	AV
30574	AIRPLANE HANGARS INC	BLOCK 16 LOT 3C	8/14/19	89,467	AV
30773	AIRPLANE HANGARS, INC.	BLOCK 16 LOT 6C	6/14/15	70,281	AV
02258	ALASKA AIR TAXI, LLC.	BLOCK 11 LOT 2A	6/30/17	35,985	AV
03239	ALASKA AIRCRAFT SALES, INC.	BLOCK 17 LOT 5	8/14/24	27,000	AV
05593	ALASKA AIRMEN'S ASSOCIATION, INC.	BLOCK 17 LOT 1A	9/30/38	21,064	AV
31690	ALASKA APPRAISAL AND CONSULTING	BLOCK 28 LOT 7	4/30/20	8,750	AV
01071	ALASKA AVIATION HERITAGE MUSEUM	BLOCK 10 LOT 4	7/1/15	89,301	AV
02125	ALASKA AVIATION HERITAGE MUSEUM	BLOCK 10 LOT 5	9/30/17	10,333	AV
31667	ALASKA DPS	BLOCK 10 LOT 12	6/30/65	107,368	AV
03880	ALASKA WING CIVIL AIR PATROL	BLOCK 10 LOT 8D, 9B	11/30/20	21,830	AV
04983	ALASKA WING CIVIL AIR PATROL	BLOCK 8 LOT 1B, 2B	10/14/17	51,598	AV
30915	BIG HANGAR, LLC.	BLOCK 10 LOT 8E	5/20/33	18,422	AV
31627	BLUE SKY HANGARS, LLC.	BLOCK 16 LOT 8L	5/31/64	44,971	AV
30772	BWANA, INC.	BLOCK 10 LOT 2C	3-Mar-18	38,842	AV
30582	DAVIDSON, DAN & GAROUTTE, KIRK	BLOCK 11 LOT 004C	7/31/12	13,527	AV
05594	ENSTROM ENTERPRISES, LLC	BLOCK 10 LOT 10E	10/31/28	31,367	AV
30521	HANGARS at LAKE HOOD LLC	BLOCK 28 LOT 2	11/30/16	5,060	AV
03299	EULE, JAMES M.	BLOCK 17 LOT 7	8/24/32	27,000	AV
31105	FLOYD, WILLIAM W.	BLOCK 28 LOT 3A	6/24/16	4,440	AV
04061	GEE BEE, INC	BLOCK 17 LOT 12	3/31/32	75,789	AV
31787	GREATLAND HANGARS ASSOCIATION	BLOCK 16 LOT 11B	4/30/67	44,420	AV
05558	HANGAR GROUP, INC.	BLOCK 17 LOT 1B	9/30/17	22,607	AV
31742	HANGARS 907, LLC	BLOCK 16 LOT 5B	3/31/66	57,835	AV
30721	HATELY, WILLIAM	BLOCK 16 LOT 4	8/21/31	50,000	AV
30864	HATELY, WILLIAM	BLOCK 16 LOT 13	10/14/52	50,277	AV
04951	INVESTMENT GROUP, INC.	BLOCK 16 LOT 9B	4/6/37	54,040	AV
32106	JENSON, JAMES AND LOREE	BLOCK 17 LOT 8	11/30/41	26,996	AV
02765	JOSEPH AND TERRY FERGERSON REVOCABLE TRUST	BLOCK 17 LOT 4	9/30/23	27,000	AV
04876	KATMAI LODGE, LLC.	BLOCK 14 LOT 3C, 4C	3/31/37	49,554	AV
31947	LAKE HOOD AIR HARBOR, INC.	BLOCK 14 LOT 2C	12/31/70	60,037	AV
31285	LAKE HOOD AIR PARK ASSOCIATION	BLOCK 16 LOT 10D	8/31/61	62,650	AV
04420	LAKE HOOD ASSOCIATES	BLOCK 17 LOT 6	1/31/36	27,000	AV
31995	LAKE SPENARD AIRPARK LLC	BLOCK 16 LOT 14	10/14/49	67,650	AV
31372	LAKE-AIRE ALASKA, LLC.	BLOCK 11 LOT 1, 1A	12/31/60	133,642	AV
32028	LAKE-AIRE ALASKA, LLC.	BLOCK 7 LOT 1B	5/17/50	139,200	AV
32055	MC LEASING, LLC	BLOCK 16 LOT 1B	1/31/51	21,369	AV
31696	MC LEASING, LLC	BLOCK 17 LOT 9 & LOT 14	5/31/48	57,450	AV
31224	MILLER, C.G.	BLOCK 16 LOT 10E	3/31/58	68,030	AV
30674	OPPORTUNITY FLYING CLUB, INC.	BLOCK 10 LOT 6	11/30/20	7,525	AV
05338	RHM ANCHORAGE, LLC.	BLOCK 28 LOTS 1, 6	7/31/40	78,851	NON AV

Lease ADA #	TENANT NAME	PROPERTY BLOCK & LOT	LEASE TERM END	LEASE SQUARE FEET	LAND USE CLASS
30597	RITA N. SHOLTON, INC.	BLOCK 16 LOT 1	6/30/25	49,070	AV
05479	RUST'S FLYING SERVICE, INC.	BLOCK 10 LOT 10C	7/31/20	27,203	AV
31293	SILVERTIP, LLC.	BLOCK 17 LOT 3	4/5/59	27,000	AV
04922	SRAMEK AVIATION SERVICES, LLC.	BLOCK 16 LOT 2	5/31/12	52,046	AUX
31475	THE POINT ASSOCIATION, INC.	BLOCK 17 LOT 2	5/31/59	40,858	AV
31434	TRINITY INVESTMENTS, LLC.	BLOCK 14 LOT 5C	6/30/62	17,920	AV
30792	U.S. DEPARTMENT OF COMMERCE, NOAA	ASOS SITE ADJACENT BLOCK 9 LOT 3	9/11/11		AV
04314	WULIK-DELONG	BLOCK 16 LOT 1A	6/30/26	43,936	AV

AV = Aviation Lease, NON AV = Non –Aviation Lease, AUX = Auxiliary Lease

Private businesses operating from LHD lease and permit areas provide services and facilities to other users such as aircraft tie downs, hangar parking, fueling services, aircraft maintenance, float storage, flight training, aircraft charters, and aircraft sales and rentals. LHD does not have a full-service fixed base operator (FBO).

Commercial Finger Leases

Aviation-related fuel sales are currently provided to LHD users by three vendors. ACE Hangars and Fuels leases space next to the Runway 14-32 gravel tie down area. This self-service fueling station uses a 6,000-gallon fuel tank which dispenses 100LL aviation fuel and averages sales of approximately 6,200 gallons a month. Both International Aviation Service and Signature Flight Support deliver fuel to aircraft upon request, using fuel trucks. Many lessees and permittees also self-fuel their own aircraft with private fuel tanks or from mobile tanks on their personal vehicles.

Ace Fuels Facility Near R/W 14-32

Rental car services are available from the nearby ANC rental car parking garage and from several Spenard Road businesses near LHD. Other services for users and the public including restaurants, hotels, convenience stores, gas stations and shops are located near LHD along Spenard Road and the adjacent commercial areas. The Lakefront Hotel is located on private land on the east shore of Lake Spenard and part of its parking lot is leased from LHD.

2.4.2 Aircraft Tie Downs, Floatplane Slips, and Ramps

A total of 829 aircraft tie downs and floatplane slips are offered by LHD (includes 38 tie downs at Charlie Parking at ANC), including the 24 transient parking tie downs for wheeled aircraft and 8 transient floatplane slips as shown in Table 2-5. The airport issues 5-year renewable permits for both tie downs and floatplane slips. In addition to these airport-managed areas, there are an estimated 349 private wheeled and floatplane parking spaces on leased land.

The following table summarizes airport-managed tie downs and slips and amenities available.

Table 2-5: Airport-Managed Aircraft Parking –2015

Aircraft Parking Area	Wheeled Spaces	Slip Spaces	Transient Spaces	Apron Area Lighting	Aircraft Electrical Service?
Alpha	83	--	12	Yes	Yes
Bravo	55	--	--	Yes	Yes
Charlie	38	--	--	Yes	No
Delta	10	--	--	Yes	Yes
Echo	159	--	--	Yes	Yes
Runway 14-32	89	--	12	No	No
Runway 14-32 Annex	8	--	--	No	No
West Ramp	11			No	No
Floatplane Slips		344	8	No	Some**
TOTAL	**453**	**344**	**32**	**--**	**--**

** Metered electrical service is available to some floatplane slips, but is not provided or managed by the Airport.

2.4.2.1 Aircraft Tie Downs

The airport manages parking primarily used by wheeled aircraft and floatplanes parked on land (dry dock) at Alpha, Bravo, West Ramp, Charlie, Delta, Echo, and Runway 14-32 Parking areas.

Alpha, Bravo, and West Ramp Parking areas are paved tie down areas located on the south and north sides of Taxilane V, west of Lake Hood and east of Postmark Drive. Both Alpha and Bravo were reconstructed in 2015 and 2016 with electric outlets and area lighting. Alpha Parking encompasses an area of approximately eight acres, and accommodates approximately 83 tie downs plus 12 transient tie downs. Bravo is slightly smaller, consisting of approximately 5 acres and accommodating 55 tie downs. Twenty of the tie downs in the center of Bravo Parking are drive through tie downs. West Ramp Parking has tie downs for 11 aircraft on both sides of the West Ramp. Floatplanes are parked on many of these tie downs.

Alpha Parking Tie Downs

Charlie Parking is a paved tie down area located on ANC west of Bravo Parking. It encompasses approximately 3.2 acres with 38 tie downs.

Delta Parking, located at the north shore of Lake Hood next to the North Floatplane Ramp, is a gravel tie down area used by wheeled, ski, and dry dock floatplane parking. Delta Parking has 10 tie downs on 2.6 acres and has both electrical outlets and area lighting.

Delta Parking Tie Downs

Echo Parking is a paved tie down area located west of Runway 14-32 and north of Aircraft Drive. This parking area, originally opened in 2003, contains electrical outlets and area lighting and accommodates 159 spaces on approximately 10 acres.

Echo Parking Tie Downs

Runway 14-32 Parking, located west of Taxiway H and Runway 14-32, is a gravel parking area primarily serving aircraft operating on Runway 14-32. The Runway 14-32 Parking area encompasses approximately 12 acres with 97 tie downs (including the adjacent 8 gravel Annex tie downs) and 12 transient tie downs.

Runway 14-32 Parking Tie Downs

Many of the tie down areas at Alpha, Bravo, West Ramp and Delta Parking are used by floatplanes, or by wheeled aircraft that switch from floats to wheels because these tie down areas are in close proximity to the North and West Floatplane Ramps.

Dry Dock Parking at the West Floatplane Ramp

In addition, some wheeled aircraft also park on slips for part of the year after float equipped aircraft are switched to wheels during the fall.

The airport provides small flight planning sheds at Alpha and Charlie Parking and at Runway 14-32 Parking as well as portable latrines at Alpha, Charlie, Delta, the Hood Strip and at the Lions Club Park.

Flight Planning Shed and Toilet

2.4.2.2 Floatplane Slips

A floatplane slip is a rectangular shaped area made by excavating the shoreline for parking floatplanes. At LHD, there are a total of 344 slips and 8 transient slips provided by the airport. As depicted in Figure 2-7, these slips are located around the majority of the shoreline of both Lake Hood and Lake Spenard, as well as the land fingers on the north side of Lake Hood. 8 transient slips are located on both sides of the Spenard Beach Park.

Floatplane Slip

Transient Floatplane Parking on Lake Spenard

Floatplane slip users are allowed to construct docks and small buildings for equipment storage at their slips, and over 200 of these buildings are found at the slips. Slip and tie down holders are allowed to have fuel storage, but it must be mobile. Several of the floatplane slip areas are used for business activities, under a commercial permit.

Lake Spenard Commercial Permit Business

Shoreline erosion at LHD is created by aircraft landings, takeoffs and taxiing, mooring and loading of aircraft as well as wind driven waves. Over the past 10 years the airport has completed several projects to dredge slips and construct shoreline erosion control. This includes erosion control and edge lighting along the E-W Waterlane and for contiguous groups of floatplane slips on the north shore of Lake Spenard and on the west shore of the Commercial Finger. Erosion control and sedimentation continues to be an issue for some LHD slip permittees that have not yet received erosion control improvements.

Floatplane Slip With Erosion Control in North Lake Spenard

2.4.2.3 Helicopters

Transient helicopters sometimes land at LHD at various locations but there is no formal transient helicopter landing area and there are no helicopters based at LHD. A formal transient helicopter landing area is provided in the South Airpark at ANC and parking and services are available at adjacent lease areas there.

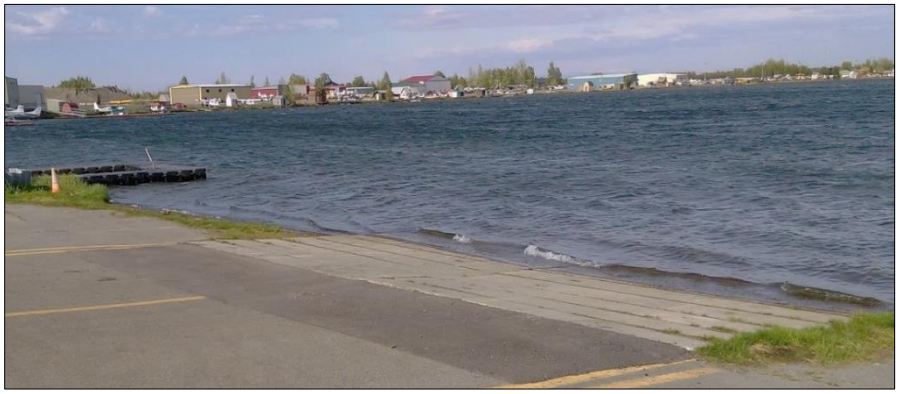
2.4.2.4 Floatplane Ramps

A floatplane ramp is a sloping platform extending from the shoreline into the water for launching floatplanes and amphibious aircraft. As depicted in Figure 2-7, LHD has two public ramps for floatplane access known as the North Ramp and the West Ramp. The North (Delta) Ramp is a 20 foot wide concrete ramp located on the north side of Lake Hood connected with Delta Parking.

North (Delta) Ramp

Delta Ramp

The West Ramp, on the west side of Lake Hood, is a 30 foot wide concrete ramp located near the intersection of Lakeshore Taxilane and Taxilane V.



West Ramp

In addition to the public ramps at LHD, many slip permit holders and leaseholders have ramps or docks for launching floatplanes. The Department of Interior has a private ramp at the south end of Lake Hood that is sometimes used, with permission, by private aircraft during strong crosswind conditions or when the lake water elevation is low.

2.4.3 Fencing and Security

2.4.3.1 Fencing

Fencing at LHD is limited to portions of the airport boundary, some wildlife fencing, and a small amount of private fencing of some floatplane slips, tie down areas and leased areas. A perimeter fence separates portions of the Turnagain neighborhood east and north of Runway 14-32. Wildlife fencing was installed on the east side of the Runway 14-32 and it extends north of Echo Parking and to Postmark Drive.

Intermittent fencing is found along sections of floatplane slips on the north and south sides of Lake Spenard as well as south of the E-W Waterlane. Many government and private hangar areas also have their own private security fences and gates.

Fenced Slip at Lake Spenard

2.4.3.2 Security

Unauthorized access to Runway 14-32 is discouraged by a set of automatic gates with fencing at the intersection of Lakeshore Taxilane, Lakeshore Drive and Aircraft Drive. Personal watercraft and vehicles and pedestrians are not allowed to use any portion of the lakes; signs and winter snow fences discourage unauthorized lake access. Aircraft accessing ANC from LHD via Taxilane V pass through gates at the intersection of Taxilane V and Postmark Drive and a gate near the

guard shack north of the North Terminal. These gates prevent unauthorized access to ANC by vehicles and pedestrians.

To enhance crime prevention efforts, Airport police and management staff conduct periodic patrols of the property. Closed-Circuit Television (CCTV) cameras have been added around LHD and an Aircraft Watch Program is in place. Gates on Lake Hood Drive and Lakeshore Drive are closed and locked on an as determined basis to discourage vandalism.

Echo Parking Security Fence

2.4.4 Roads, Parking and Pedestrian Routes

2.4.4.1 Roads

International Airport Road, on the south side of LHD, is the primary arterial access to LHD and is used by most vehicular traffic accessing the airport. West Northern Lights Boulevard, on the north, provides secondary access via Postmark Drive and Hood Drive. Spenard Road, on the east, provides a third access route to LHD via Wisconsin Avenue and Lakeshore Drive.

The main internal roads at LHD are Lakeshore Drive, Aircraft Drive, and Aviation Avenue. All three are paved, two-lane roads. A guardrail and signs along Aircraft Drive on the west side of Lake Hood deter the public traffic from entering Lakeshore Taxilane. Aircraft Drive and Lakeshore Taxilane intersect north of Lake Hood at pilot controlled gates where Aircraft Drive

becomes Lakeshore Drive. Lakeshore Drive continues south around the lake and intersects with Wisconsin Avenue on the east side of Lake Hood.

From the Central Region DOT&PF building, Aviation Avenue runs along the south side of Lake Spenard to Spenard Road, providing access to float slips and the International Coast Hotel just outside of the LHD boundary. Other internal circulation is provided from Heliport Place, Helio Place, Lake Spenard Drive, Enstrom Circle, Vought Circle, Lear Court, Rutan Place, Tom Wardleigh Drive, Floatplane Drive, and unnamed gravel roads on the non-commercial fingers.

As discussed in Section 2.6.3 several roads at LHD are also used by aircraft or are crossed by aircraft. Aircraft crossing Postmark Drive at Taxilane V and crossing Lakeshore Drive at its intersection with Lakeshore Taxilane and Aircraft Drive are managed by a pilot controlled crossing gate and highly visible markings. Once a pilot activates the gate, vehicular traffic must stop to allow aircraft to taxi through the intersection.

Lakeshore Drive / Lakeshore Taxilane Intersection

Shared use roads at LHD used by both vehicular and aircraft traffic are highlighted in Figure 2-4. Section 5 of the LHD Airport Operations Manual has safety restrictions for the use of Lakeshore Drive, Lake Shore Taxilane and Floatplane Drive. Aircraft have priority, and vehicles and pedestrians must yield to aircraft. Pedestrians must walk to the side or off the paved surfaces, face traffic, and remain outside the double yellow line. Headphones may not be worn around aircraft. Pets must be kept on a leash at all times.

2.4.4.2 Parking

Individual leaseholders are required to provide parking for their employees and customers. A tie down permit holder is allowed to leave a vehicle parked in the tie down spot while using the aircraft. Floatplane slips are typically large enough to provide parking for one vehicle in addition to the aircraft. Additional free public parking areas are available along Aircraft Drive just south of the Aviation Heritage Museum, along Lakeshore Drive on the west side of the Runway 14-32 tie down area, near the south end of the Commercial Finger, and at public viewing/picnic areas at the Lions Club Park, Spenard Beach and south of the E-W Waterlane channel.

Vehicle Parking Along Lakeshore Drive

2.4.4.3 Pedestrian Route and Recreation Areas

The designated pedestrian route around LHD shown in Figure 2-4 is used by pedestrians and bikers. Some use the pedestrian route to access the Tony Knowles Coastal Trail or other destinations while many enjoy walking the entire perimeter of Lakes Hood and Spenard. The pedestrian route follows Lakeshore Drive on the north side of Lake Spenard, past the Spenard Beach and Lions Club Park. The pedestrian route is separated from Lakeshore Drive for a short distance near Lions Club Park, then it parallels and follows Lakeshore Drive and Aircraft Drive around the north and west sides of Lake Hood until Heliport Place. From Heliport Place, the route follows Postmark Drive around the south side of Lake Hood to Rutan Place. At Rutan Place, a pedestrian can either follow International Airport Road or Aviation Avenue along the lake around the east side of Lake Spenard and alongside Lake Spenard Drive, behind the

Lakeside Hotel. Most of the pedestrian route located on LHD property is marked with blue walkway signs designating the location.

Lake Hood Pedestrian Route

Recreation areas used by the general public to view LHD operations and for other uses include the Lions Club Park, Spenard Beach Park, and viewing areas near the Lions Club Park and E-W Waterlane.

E-W Waterlane Viewing Area

Spenard Beach Park is a municipal park. Although this park is airport owned it has been maintained by the MOA on a temporary basis. Swimming in the summer or skating on the lake in the winter is not permitted.

Spenard Beach Park

2.4.5 Utilities

2.4.5.1 Public Water and Sewer Services

Public water and sewer service at LHD is provided by the Anchorage Water and Wastewater Utility (AWWU). Lease areas at LHD have access to water and sewer, including the most recent extensions to serve tenants on Vought Circle, Enstrom Circle and Floatplane Drive (Commercial Finger). A deep water well was also drilled near Vought Circle on the south side of the lake to pump fresh water for lake level support. Portable toilets have been distributed by the airport around LHD for pilot and public use. An aircraft wash area along Lakeshore Taxilane across from ANC's Field Maintenance Facility is used during non-winter months.

Aircraft Wash Area

2.4.5.2 Electric Power, Natural Gas and Telephone Service

Electric power is provided by Chugach Electric Association to all leased areas on the lake, to Alpha, Bravo, Charlie, Delta and Echo tie downs, and to many of the floatplane slips. Natural gas is supplied to LHD tenants by ENSTAR Natural Gas Company. Telephone service is provided by Alaska Communications Systems.

2.4.6 Operations, Administration, and Maintenance

As discussed in Section 2.3, LHD is part of the AIAS, and airport staff who maintain ANC also maintain LHD. The ANC/LHD Field Maintenance Department personnel maintain safe aircraft movement areas, public roads, and walkways at LHD. They are also responsible for general airfield maintenance, snow removal, minor slip maintenance and dredging, and aquatic weed harvesting.

LHD Weed Harvester

LHD management and administration are handled by two LHD staff located on subleased office space on the west shore of Lake Hood. Field Maintenance personnel work from two primary facilities located on ANC. One is a building just west of Postmark Drive and north of the International Terminal and the other is a building next to LHD north of Tom Wardleigh Drive and west of Aircraft Drive. Airport Fire and Rescue staff serving LHD are housed at the fire station on ANC near Taxiway R. A boat house next to the West Floatplane Ramp is used for LHD water rescue.

LHD Boat House Next to West Ramp

2.5 Environmental Conditions

This section addresses environmental conditions and possible environmental constraints on future development of LHD.

2.5.1 Climate

The Anchorage area climate is considered transitional between maritime and continental climate zones, and receives an average of 16.6 inches of total precipitation measured as rain, of which there are 74 inches of snow per year. Average temperatures in July range from 52 to 65 degrees Fahrenheit, and in January range from 11 to 23 degrees Fahrenheit. Prevailing winds blow from the north and east in winter (September through May), and from southeasterly to west-northwesterly in the summer (May through August). With active volcanoes within less than 100 miles of Anchorage, ashfall is a significant, but infrequent hazard to aviation.

2.5.2 Geology

Late Pleistocene period glacial deposits left sediments of fine grained silty clays and coarser-grained sands and gravels in the LHD area. The silty clays have been responsible for ground failure and landslides northeast of the Airport during the 1964 earthquake[2]. LHD is located in a lake lowland area. Lowlands are poorly drained, and have peaty soils, with an underlying layer of clay. The subsurface peat layer is 2 to 10 feet deep, with sand underneath. Below the sand is a shallow flowing aquifer, and a deep confined aquifer. Groundwater flows north towards Jones Lake. There is no evidence of permafrost in the area.

2.5.3 Air Quality

The U.S. Environmental Protection Agency (EPA) sets air quality standards for six pollutants known to impact human health. Areas within the MOA currently meet all of these standards. The southern portion of Lake Hood and all of Spenard Lake are located within a carbon monoxide (CO) maintenance area boundary within the MOA. This area was previously classified as non-attainment for CO exceedances in the 1970s, but no violations of air quality have occurred since 1996. An air quality study was completed in 2003 to address concerns regarding air pollution and odors in areas close to ANC, including facilities at LHD[3]. No links between the airports and the odors were found. According to a 2007 inventory of pollutants in the

[2] HNTB Corporation, *Ted Stevens Anchorage International Airport Master Plan Update*, November 2002.
[3] Municipality of Anchorage, 2003.

Anchorage Bowl, while 79% of winter season CO emissions were from motor vehicles, only 7.8% of CO emissions came from ANC[4].

2.5.4 Water Quality

Lakes Hood and Spenard encompass an area of about 307 acres[5], with a drainage basin of about 1,490 acres[6]. Much of the area around the lakes is developed and paved, creating runoff into the lakes. Storm water and surface runoff from ANC also impact the lakes' water quality, although ANC has substantially reduced winter runoff to the lakes over the last 10-15 years.

Section 303(d) of the Clean Water Act directs states to identify water bodies that do not meet water quality standards and to develop plans to bring these waterbodies into compliance. The Alaska Department of Environmental Conservation (DEC) listed Lakes Hood and Spenard as 303(d) impaired water bodies in 1992 for excess fecal coliform bacteria, and in 2003 for low dissolved oxygen (DO). Fecal coliform bacteria levels were related to high numbers of waterfowl on and around the lakes and were reduced by active hazing to reduce waterfowl numbers. Low DO levels were related to the breakdown of glycol discharged to the lakes in ANC winter stormwater runoff.

A Water Body Recovery Plan and an Airport Deicing Management Program were developed and implemented over the last 10-15 years to address water quality in the lakes. ANC has constructed several drainage improvements that have redirected winter glycol-containing runoff from the lakes, resulting in steady improvements in water quality.

DEC prepares an Alaska Impaired Waters list and report every two years; the latest year in which the Alaska Impaired Waters list was officially approved by EPA was 2010. By 2010, Lakes Hood and Spenard had achieved compliance with fecal coliform standards and were no longer on the 303(d) list for this pollutant. The 2014 Alaska Impaired Waters list awaiting EPA approval

[4] Municipality of Anchorage, Summary of Air Monitoring Data and Trends 1980-2012, 2011.
[5] Alaska Department of Environmental Conservation, 2010 Alaska's Impaired Waters Report.
[6] ASCG, Inc., *Lake Hood Airport Master Plan Update*, 2006.

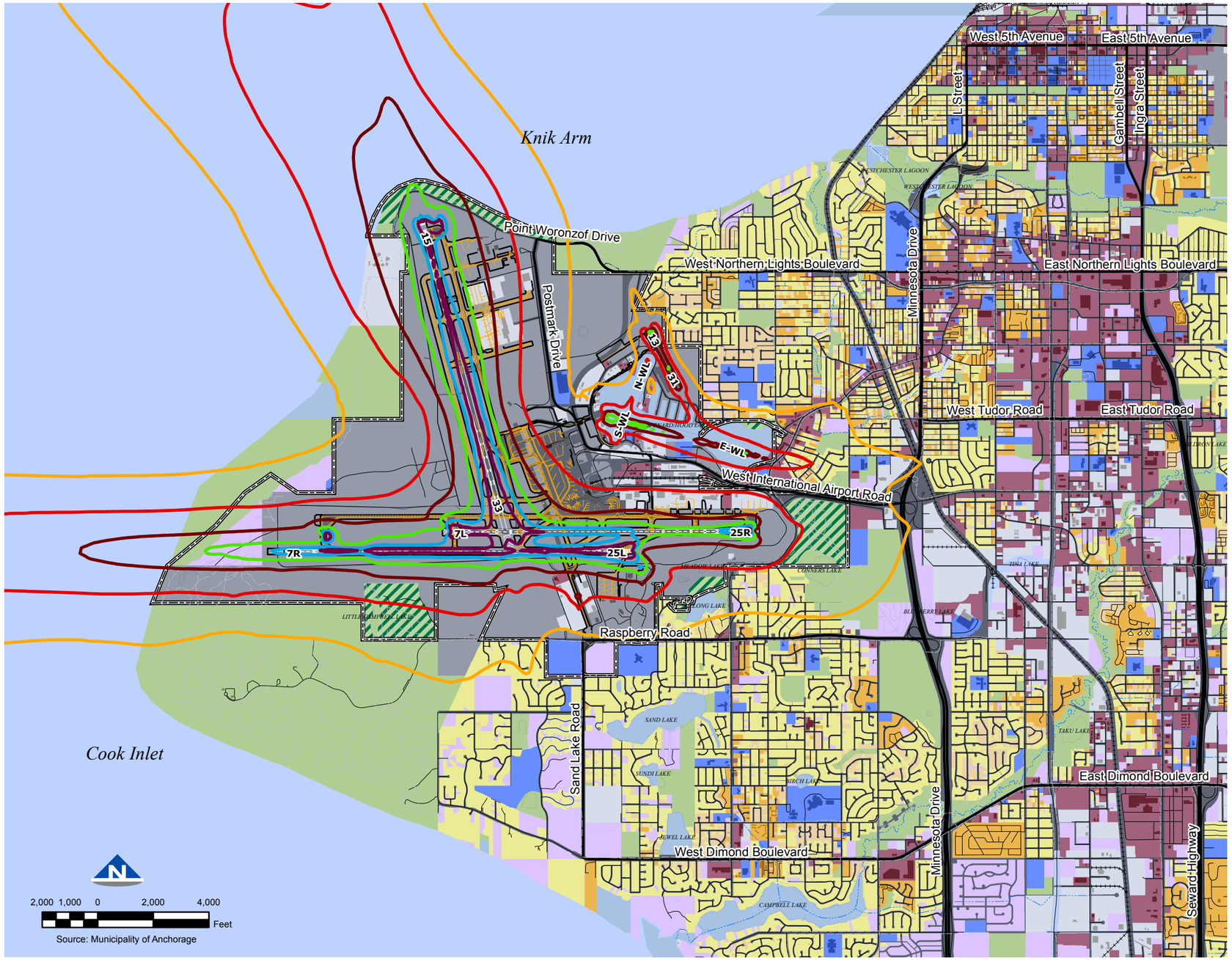
proposes to take Lakes Hood and Spenard off the 303(d) list for low DO[7]. Once that list is approved the lakes will no longer be considered impaired water bodies.

2.5.5 Noise and Compatible Land Use

LHD is located on the east side of ANC and has residential areas adjacent to the north and east. Residential areas may be adversely affected by airport noise, and the Federal Aviation Administration (FAA) provides guidelines to airports for evaluating potential noise impacts and implementing measures to reduce noise and non-compatible land uses near airports. FAA land use guidelines indicate that residential and other noise sensitive land uses are not compatible in areas where the noise level is greater than 65 Day-Night Equivalent Sound Level (DNL). ANC has worked to implement noise abatement and land use compatibility measures to reduce noise levels and improve land use compatibility in areas near ANC and LHD. These measures have included residential land acquisition, a residential sound insulation program, and other noise abatement and mitigation measures.

The 2015 Federal Aviation Regulation (FAR) Part 150 Noise Compatibility Study Update (Part 150 Study) examined the compatibility of land uses near ANC (including LHD) within existing (as measured in 2009), and future (2020) noise contours (see Figure 2-8). The study also evaluated potential noise reduction and abatement measures and recommended measures for implementation.

[7] Alaska Department of Environmental Conservation, Water Quality Division.



Land Use

- INDUSTRIAL
- TRANSPORTATION
- RR/ROW
- COMMERCIAL
- INSTITUTIONAL
- SINGLE FAMILY
- TWO FAMILY
- MULTI FAMILY
- PARK
- TIDE/WATER
- VACANT

Future 2020 Noise Contours

- 60 DNL
- 65 DNL
- 70 DNL
- 75 DNL
- 80 DNL
- 85 DNL

The 65 DNL contour contains approximately 5122 acres, 101 residential structures and 226 people.

The 70 DNL contour contains approximately 1970 acres, no residential structures and no people.

The 75 DNL contour contains approximately 894 acres, no residential structures and no people.

Planning jurisdictions are shown on the map.

Noise measurement sites and flight tracks are depicted on the Noise Measurement Sites and Flight Tracks Maps.

Residential land use, as defined by FAR Part 150, is an incompatible use without proper sound attenuation within the 65 DNL or greater contour.

The Noise Exposure Maps and accompanying documentation for the Noise Exposure Map for Anchorage International Airport, submitted in accordance with FAR Part 150 with the best available information, are hereby certified as true and complete to the best of my knowledge and belief.

In addition, it is hereby certified that the public was afforded the opportunity to review and comment on the document and its contents.

Signed_____Date_____

Figure I1 **Future Noise Exposure Map - 2020**

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The Part 150 Study recommends a residential sound insulation program for eligible structures. The program would include eligible residences within the 2020 forecast 65 DNL noise contour. There are approximately 45 residences within the forecast 2020 65 DNL contour that were not within the previous 65 DNL contour and therefore previously were not eligible for the residential sound program. Additional eligibility criteria will need to be evaluated on these homes to determine which, if any, may be eligible. The Part 150 Study also recommends construction of a noise barrier near the LHD gravel strip to reduce ground noise in adjacent residential neighborhoods; however, this recommendation was not approved for FAA funding due to limited benefit.

Some recreation uses may also be considered noise sensitive. Non-aviation-related recreation uses are allowed on LHD at the Lions Club picnic area and Spenard Beach Park, and use of other designated paved surfaces at LHD for bicycling, walking and roller skating are allowed as temporary non-aviation uses of LHD property; these uses are not considered to be non-compatible from a noise perspective.

ANC and LHD continue to work with the Municipality of Anchorage (MOA) to address land use compatibility in areas adjacent to the airports. Land use within MOA near LHD is guided by the Anchorage Bowl Comprehensive Plan (Anchorage 2020), the West Anchorage District Plan, and associated MOA planning and zoning regulations.

2.5.6 Fish

The Alaska Blackfish (*Dallia pectoralis*) and the Three-Spine Stickleback (*Gasterosteus aculeatus*) reside in some lakes in the area, and were assumed to inhabit Lakes Hood and Spenard. However, a 2011 survey performed by the Alaska Department of Fish and Game found neither of these species in the lakes at that time[8].

[8] Ted Stevens Anchorage International Airport, *Airtimes,* Winter Newsletter, 2012.

2.5.7 Wildlife and Birds

The wetlands surrounding LHD, as well as Lakes Hood and Spenard, provide habitat for a wide variety of wildlife and birds.

Wetlands areas near LHD, such as Turnagain Bog, provide feeding, breeding, and resting habitat for waterfowl and shorebirds such as the greenwinged teal, greater and lesser scaup, northern pintail, Canada goose, American widgeon, mallard, northern shoveler, rednecked phalarope, lesser yellowlegs, common snipe, and short-billed dowitcher[9]. Surveys by the U.S. Fish and Wildlife Service have identified a few bald eagle nests within the ANC property, though none are on LHD facilities. Special status species that may be present on or near LHD are listed in Table 2-6.

Areas around and within the ANC boundary provide habitat for small mammals such as red squirrels, coyotes, snowshoe hares, ermine, shrews, and a variety of other small rodents. In addition, a few black bear and red fox live in forested areas near LHD. Because of the forest, shrub, and wetland areas, moose are common year-round on ANC and LHD.

Migratory birds and moose in airport areas are considered aviation hazards. FAA records show that between January 1, 2010 and September 30, 2014, there were 63 incidents of aircraft striking birds or wildlife at ANC, and 252 strikes in all of Alaska, an average of about 13 and 53 per year respectively[10]. ANC has developed a Wildlife Management Program in response to the aviation risk of collisions with birds and wildlife. This program, which includes the areas around LHD, works to deter wildlife from using areas also used by aircraft.

[9] Ann Rappoport, United States Fish and Wildlife Service, December 1994.
[10] FAA National Wildlife Strike Database, http:// http://wildlife.faa.gov/database.aspx

Table 2-6: Special Status Bird Species That May Be Present On or Near ANC/LHD

Common Name	Scientific Name	Conservation Status[9]
Bald eagle	*Haliaeetus leucocephalus*	FS
Bank swallow	*Riparia riparia*	FS
Belted kingfisher	*Megaceryle alcyon*	FS
Boreal owl	*Aegolius funereus*	FS
Boreal chickadee	*Poecile hudsonicus*	FS
Brown creeper	*Certhia americana*	FS
Common loon	*Gavia immer*	FS
Dark-eyed junco	*Junco hyemalis*	FS
Great-horned owl	*Bubo virginianus*	FS
Hairy woodpecker	*Picoides villosus*	FS
Hermit thrush	*Catharus guttatus*	FS
Horned grebe	*Podiceps auritus*	BCC, FS,
Lesser yellowlegs	*Tringa flavipes*	BCC, FS, WL
Merlin	*Falco columbarius*	FS
Northern goshawk	*Accipiter gentilis*	FS
Northern hawk owl	*Surnia ulula*	FS
Olive-sided flycatcher	*Contopus cooperi*	BCC, FS, WL
Pacific loon	*Gavia pacifica*	FS
Pine grosbeak	*Pinicola enucleator*	FS
Pine siskin	*Spinus pinus*	FS
Red-breasted nuthatch	*Sitta canadensis*	FS
Red-necked grebe	*Podiceps grisegena*	FS,
Rusty blackbird	*Euphagus carolinus*	WL, BCC, FS
Solitary sandpiper	*Tringa solitaria*	BCC, FS, WL
Varied thrush	*Ixoreus naevius*	WL,FS
Violet-green swallow	*Tachycineta thalassina*	FS
White-winged crossbill	*Loxia leucoptera*	FS
White-crowned sparrow	*Zonotrichia leucophrys*	FS
Wilson's warbler	*Wilsonia pusilla*	FS

Source: RS&H, *Ted Stevens Anchorage International Airport Master Plan Update*, 2014.
Notes:
1 - Conservation Status: FS = Featured Species (AK Dept. of Fish and Game, *Our Wealth Maintained: A Strategy for Conserving Alaska's Diverse Wildlife and Fish Resources*, 2006); BCC = Birds of Conservation Concern (U.S. Fish and Wildlife Service, *Birds of Conservation Concern*, 2008); WL = Watch List Species (Kirchoff, M. and V. Padula, *The Audubon Alaska Watch List*, 2010).

[9] FAA National Wildlife Strike Database, http:// http://wildlife.faa.gov/database.aspx

2.5.8 Vegetation

Vegetation in the lower wetlands areas near Lakes Hood and Spenard includes buckbean, marsh cinquefoil, water sedge, livid sedge, and sweet gale. Vegetation in areas of higher ground include a mixture of shrubs, including shrubby cinquefoil, shrub birch, ericaceous shrubs, and non-patterned wetland forests of black spruce[11].

2.5.8.1 Aquatic Vegetation

Aquatic vegetation grows excessively in Lakes Hood and Spenard, and has impacted floatplane operation conditions in the lakes. Species growing in the lakes include northern milfoil, water bulrush, spatterdock, sago pondweed, small spikerush, needle spikerush, bushy pondweed, flat-stemmed pondweed, farwell's milfoil, horned pondweed, and clasping leaf pondweed[12].

In 2005, the DOT&PF developed an Aquatic Vegetation Management Plan for LHD. Under this plan, the ANC management is responsible for excess aquatic vegetation in open water of the lakes, and slip owners are responsible for that vegetation within their slips. While previously ANC relied on mechanical harvesting, or "mowing" of aquatic plants at LHD, in 2015 the Alaska Department of Natural Resources successfully launched a elodia weed eradication program at LHD using chemical control methods. While directed toward removing elodia, this program also reduced the presence of other lake weeds. The Department of Natural Resources plans to continue to monitor and assist ANC staff with controlling LHD weeds, operating under an ongoing permit.

2.5.9 Contaminated Sites

Many hazardous spills have been documented over the years in the LHD area. ANC worked with LHD tenants and slip owners in the late 1990s to remove leaking underground fuel storage tanks and to remediate contamination. Of the more than 150 contaminated sites at or near LHD listed in the DEC contaminated sites database, most sites were associated with leaking underground tanks and have been remediated and closed. Only two sites on LHD are

[11] Ott Engineering, *Lake Hood General Aviation Facility Expansion Environmental Assessment*, Anchorage International Airport, no date.
[12] Ch2MHill, *Anchorage International Airport Aquatic Vegetation Management Plan*, April 2005.

considered open sites under investigation and remediation, both associated with the Department of the Interior Office of Aircraft Services site (Table 2-7). Another eight sites are closed with Institutional Controls. This means that no further investigation or remediation is required as long as the site is operated in compliance with approved control measures designed to protect people and the environment from exposures to contaminants that may remain after cleanup activities.

In addition to the contaminated sites on LHD, the contaminated sites database lists the Regal Alaska Hotel (now the Lakefront) as an open contaminated site adjacent to Lake Spenard. The site record indicates that there was a spill from an above ground storage tank in 1992. The site does not appear to have active remediation underway, but it is not classified as closed by DEC.

Table 2-7: Active Contaminated Sites at LHD

Hazard ID No.	Site Name	Site Address	Type	Status
4119	AIA Block 16, Lot 11	3635 Aircraft Drive	Unknown	Institutional Controls
23159	Jim Air, Block 17, Lot 1A	4200 Float Plane Dr.	Underground Tank	Institutional Controls
23328	Alaska Wing Civil Air Patrol, Block 10, Lot 9	4621 Aircraft Drive	Underground Tank	Institutional Controls
23383	Alaska Rent-a-Car	4900 Aircraft Drive	Underground Tank	Institutional Controls
23409	Lake Hood Air Harbor	4955 Aircraft Drive	Underground Tank	Institutional Controls
23923	Lake Aire Complex	4451 Aircraft Drive	Underground Tank	Institutional Controls
24021	Alaska Aviation Heritage Museum	4721 Aircraft Drive	Underground Tank	Institutional Controls
24877	Northshore Aviation	Lake Hood/AIA	Underground Tank	Institutional Controls
3312	U.S. Fish and Wildlife Service	4343 Aircraft Drive	Historic Release Encountered	Open
24026	Department of Interior, Office of Aircraft Services	4343 Aircraft Drive	Underground Tank	Open

Source: DEC Contaminated Site Database at http://dec.alaska.gov/Applications/SPAR/PublicMVC/CSP/Search. Accessed April, 2015.

2.5.10 Wetlands

Wetlands are valuable because of their water surface flow, migratory and nesting bird habitat, fish habitat, water quality functions, seasonal flood water conveyance, and aquifer recharge. The Anchorage Wetlands Management Plan was updated by the MOA in 2012, and this report

identifies wetlands located on and near LHD. The majority of the vegetated areas around LHD are designated wetlands. Turnagain Bog is the largest wetland area on ANC, and is directly north of Lake Hood. Figure 2-9 shows these wetlands.

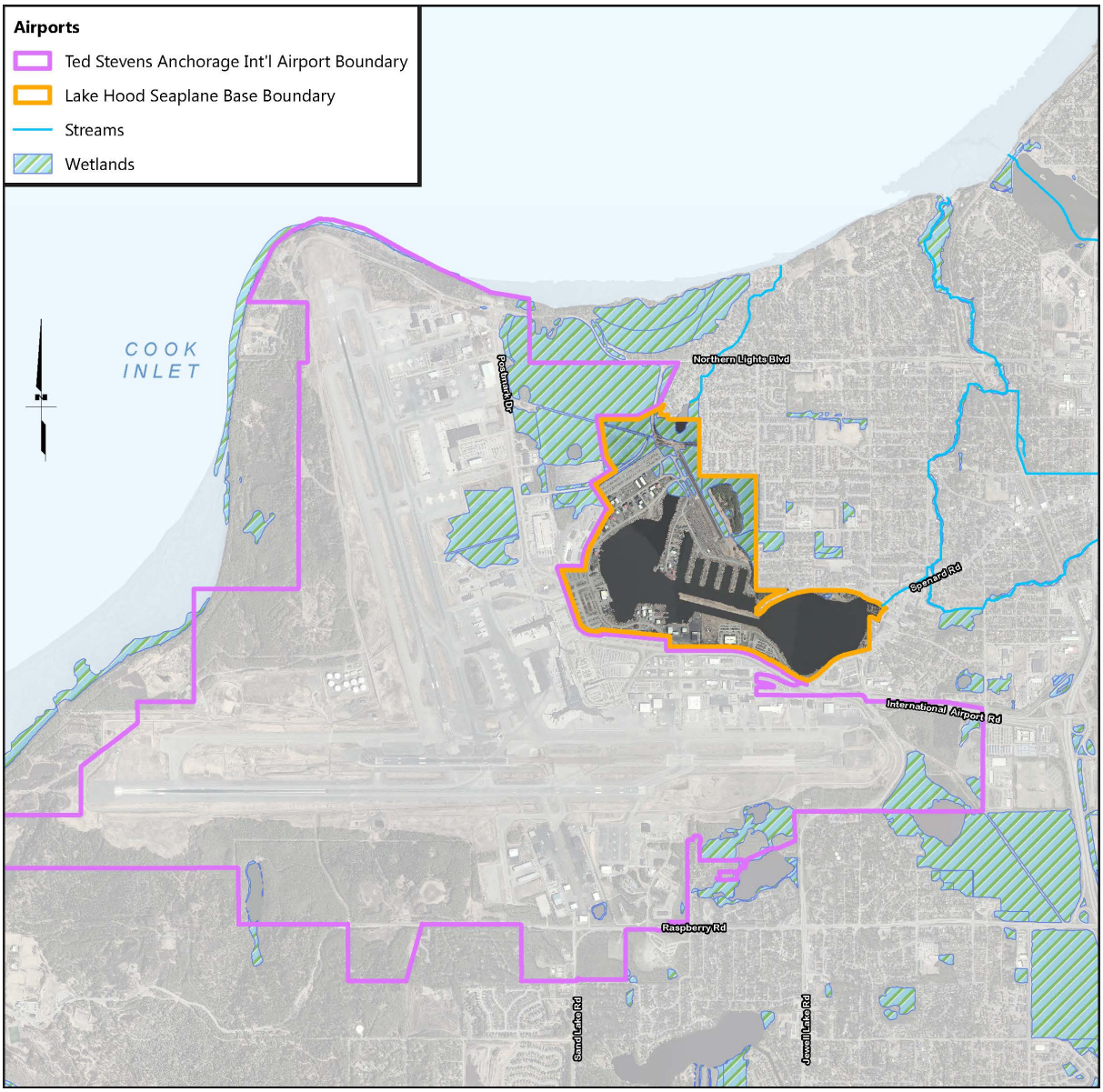

Figure 2-9: ANC/LHD Wetlands

Turnagain Bog is mainly a peat bog surrounded by forested wetlands. It contains about 411 acres of wetland, and a few of those acres have been paved[13]. Aviation development associated with LHD has occurred on the south and west sides of the bog, and it has been surrounded by local roadways. A MOA water and wastewater pipeline runs diagonally under the bog.

Future projects at LHD that could impact Turnagain Bog or other wetlands would require wetland delineation, a U.S, Army Corps of Engineers jurisdictional determination, and a CWA Section 404 permit for fill in wetlands. Fill of wetland areas at LHD would likely require mitigation of wetland issues. Wetland credits for mitigation may be available for projects at LHD from a wetland preservation project at Klatt Bog in South Anchorage[14].

2.5.11 Floodplains

Floodplains are generally located in flat lowland areas near coastal or inland waters subject to a 1% or greater chance of flooding in any given year. The Federal Emergency Management Agency (FEMA) publishes maps of these areas subject to flooding that are currently regulated through Executive Order 11988. The Order directs FEMA to reduce the risk of flood loss, and to restore and preserve the natural beneficial values served by floodplanes.

Figure 2-10 shows areas subject to flooding on or near ANC and LHD. The majority of the LHD property is within Zone X, which is outside of the 0.2% chance of annual flooding. Lakes Hood and Spenard are in Zone A, a special flood hazard area. Zone A also contains wetlands directly north of Lake Hood leading to Jones Lake and Hood Creek.

[13] CRW Engineering Group, *Ted Stevens International Airport Storm Drainage Master Plan*, November 2000
[14] Lyttle, Scott, ANC Environmental Program Manager, telephone conversation, April, 2015.

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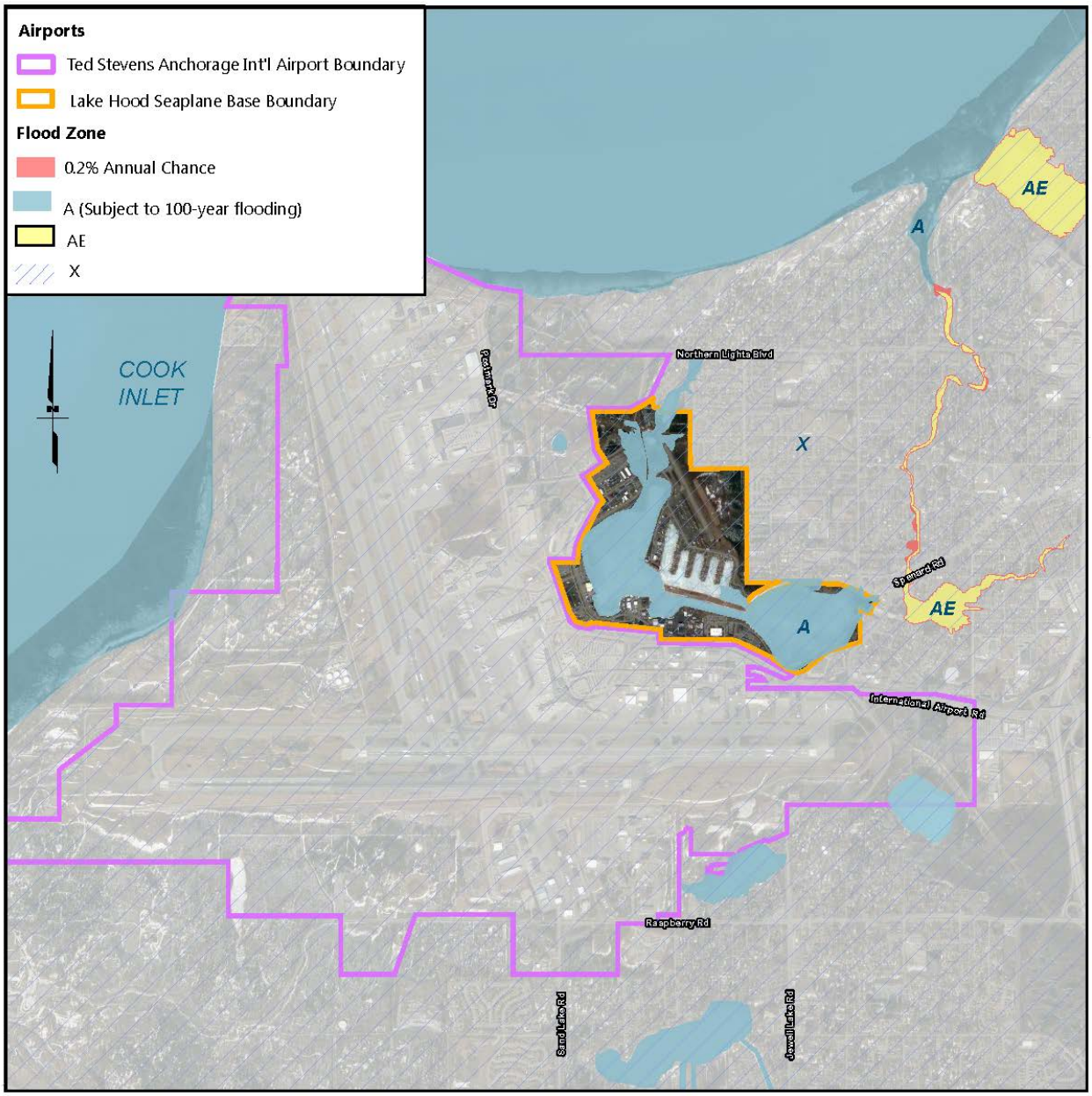

Figure 2-10: ANC/LHD Floodplains

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2.6 Revenues and Expenses

LHD revenues and operating expenses for 2015 are summarized in Table 2-8. While revenues shown are actual 2015 revenues, operating expenses are estimates. Aside from the full time LHD Airport Manager and Leasing/Tie down staff, all other staff working on LHD maintenance, operations, and administration/management are shared between ANC and LHD. There is no accounting of the allocation of staff time, commodities and other expenses to LHD, so the expenses are estimated using ANC/LHD staff's professional judgement.

Airport revenues and expenses are allocated to the International Airport Revenue Fund, along with the revenues and expenses of ANC and FAI. Because LHD revenues do not cover the operating expenses, as shown below, revenues from user fees paid by ANC users are used to cover LHD's operating deficit. LHD user fees will be increased in 2017, which should slightly reduce LHD's operating deficit.

LHD capital costs vary from year to year and are not included in the expenses below.

Table 2-8: 2015 Lake Hood Revenues and Operating Expenses

Lake Hood Revenues (actual)		Lake Hood Operating Expenses (estimated)	
Tie Downs	$253,000	Administration	$498,000
Slips	$414,000	Field and Equipment Maintenance	$1,373,000
Land Leases	$194,000	Safety	$578,000
		Operations	$445,000
		Facilities (utilities)	$43,000
		Other	$178,000
Total Revenue	**$861,000**	**Total Expenses**	**$3,115,000**

2.7 Issues

Airport users, neighbors and other stakeholders were invited to identify LHD Airport Master Plan issues through a variety of methods including interviews, surveys, public open house meetings, comment sheets, Advisory Committee Meetings, and meetings with stakeholder groups such as the Alaska Airmen Association and Lake Hood Pilots Association. While the focus of the issues identification was on Airport Master Plan issues, in some cases the issues identified were more related to airport management, maintenance, or operations issues. All

issues identified were shared with airport staff so that they could be addressed outside the master plan, if appropriate.

The initial April 2015 User Survey (Appendix B), completed by 292 respondents, captures the primary issues that were brought up over the course of the study. The highest ranked master plan issues from the survey are summarized below. Those followed by an asterisk * were also rated as highest priority issues at the first public open house meeting.

1. More floatplane parking *
2. Affordable hangars and lease lots *
3. Electric power to tie downs
4. Security *
5. Aircraft/pedestrian access and conflicts *
6. Slip erosion control and maintenance
7. Aprons/taxiways/roads paving and drainage
8. More tie downs
9. Slips with Runway 14-32 access

3.0 FORECASTS

This chapter presents the passenger and general aviation aircraft activity forecasts for LHD. Furthermore, it discusses air-taxi/commercial activity and feedback received from tenant interviews. It verifies and updates data and assumptions from the FAA-approved 2013 Alaska International Airport System (AIAS) Planning Study (AIAS Planning Study) forecast and provides more specific information about LHD for developing facilities requirements for the Master Plan. The analysis will be used in the LHD Master Plan to establish LHD facility expansion or improvement. The Master Plan forecast uses a 20-year planning horizon for facilities planning. The base year for this forecast is 2014 with incremental planning horizons at 2020, 2025, and 2035.

3.1 Regional Base for Aviation Activity

This section identifies the prime geographic area served by the Airport and the regional characteristics which influence aviation demand. This regional analysis provides a basis for identifying and understanding the greater Anchorage urban area and its ability to support aviation activity at LHD. The key demographic characteristics of the Anchorage Metropolitan Statistical Area (Anchorage or MSA) were evaluated. The MSA is composed of the Anchorage and Matanuska-Susitna Boroughs.

3.1.1 Historical and Projected Socioeconomic Data

Current and projected economic trends and population projections associated with the Airport's MSA were examined and compared to those of Alaska and the U.S. One of the leading objective sources for assessing market growth in the U.S. is Woods and Poole Economics, Inc. The 2014 Woods and Poole data were used to provide forecasted information on population and per capita personal income (PCPI) growth for the region, state, and nation.

One unique aspect of the Alaskan economy is the heavy involvement of the oil industry. Anchorage, in particular, acts as the oil headquarters for the region. Oil revenues make up over 80% of state revenues and oil price fluctuations have the potential to impact staffing in both the public and private sectors. Oil prices have always been cyclical and although current oil

prices are low, they will likely rise in the future. Therefore, these fluctuations have direct impacts on population growth, wage growth, and general economic growth in Anchorage and Alaska.

3.1.1.1 Population

Historically, between 2004 and 2011, the rate of population growth in the Anchorage MSA, indicated as the Average Annual Growth Rate (AAGR), has outpaced that of the State of Alaska and the U.S. as a whole. Since 2004, the population in the U.S. grew at a rate of 0.9 percent annually, while the State of Alaska grew at 1.3 percent annually, compared to the growth of Anchorage at 1.7 percent annually. While projected growth in all three of these segments is expected to slow, Anchorage is still expected to lead annual growth at 1.3 percent, versus 1.0 percent and 0.9 percent for the state and the U.S. respectively. The historical and projected population comparison between the MSA, the state, and the nation is shown in Table 3-1.

Table 3-1: Historical and Forecast Population Comparison

Year	Anchorage Population	Alaska Population	U.S. Population
2004	345,245	659,286	292,805,298
2005	350,903	666,946	295,516,599
2006	358,718	675,302	298,379,912
2007	360,194	680,300	301,231,207
2008	365,633	687,455	304,093,966
2009	374,562	698,895	306,771,529
2010	383,128	714,146	309,330,219
2011	387,516	722,718	311,591,917
Projected			
2012	392,890	730,594	314,659,175
2013	398,378	738,620	317,790,897
2014	403,966	746,767	320,976,914
2015	409,618	754,972	324,186,934
2020	438,784	796,691	340,554,347
2025	469,159	838,938	357,193,542
2035	532,054	922,095	390,162,755
Average Annual Growth Rate			
2004-2011	1.7%	1.3%	0.9%
2011-2035	1.3%	1.0%	0.9%

Source: Woods and Poole Economics, Inc. 2014 - Anchorage MSA Profile including Anchorage Borough and Matanuska-Susitna Borough
Note all data for years 2012 to 2035 are projected

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3.1.1.2 Per Capita Personal Income

PCPI is a reliable economic indicator for determining the purchasing power of consumers within a selected region. Increases in this metric typically equates to a greater ability to afford participation in aviation activities.

Current Woods & Poole data also were used for comparing PCPI. The latest available data that would permit comparison between Anchorage, Alaska, and the U.S. is for calendar year 2011. Between 2004 and 2011, PCPI in Anchorage has grown at an average rate of 3.5 percent annually, as shown in Table 3-2.

Table 3-2: Personal Income Per Capita Comparison (2014 Dollars)

Year	Anchorage	Alaska	U.S.	Anchorage/U.S.
	Total Personal Income Per Capita	Total Personal Income Per Capita	Total Personal Income Per Capita	Total Personal Income Per Capita Ratio
2004	38,373	34,993	33,909	1.13
2005	40,265	36,911	35,452	1.14
2006	42,256	38,951	37,726	1.12
2007	44,735	41,316	39,507	1.13
2008	48,243	44,816	40,947	1.18
2009	45,625	42,713	38,637	1.18
2010	46,815	43,749	39,791	1.18
2011	48,810	45,665	41,561	1.17
Projected				
2012	50,443	47,034	42,681	1.18
2013	51,496	48,052	43,597	1.18
2014	53,031	49,525	44,927	1.18
2015	54,741	51,167	46,411	1.18
2020	66,713	62,639	56,808	1.17
2025	84,548	79,737	72,344	1.17
2035	139,758	132,868	120,708	1.16
Average Annual Growth Rate				
2004-2011	3.5%	3.9%	2.9%	
2011-2035	4.5%	4.6%	4.5%	

Source: Woods and Poole Economics, Inc. 2014 - Anchorage MSA Profile including Anchorage Borough and Matanuska-Susitna Borough
Note all data for years 2012 to 2035 are projected

Alaska PCPI has grown at an even higher rate of 3.9 percent annually. This is an entire percentage point higher than the U.S. rate, which grew at an average of 2.9 percent annually. The difference is attributed to the U.S. population, as a whole, having a more pronounced decrease in personal income over the course of the recent extended recession.

Over the next twenty years, the Anchorage PCPI is expected to increase at a rate of 4.5 percent. This is equal to the anticipated rate for the rest of the U.S. The Alaskan average PCPI growth rate is expected to be slightly higher at 4.6 percent. The positive message from this analysis is that the current rates of economic growth in Anchorage and Alaska are still favorable and expected to maintain pace with the overall U.S. rate. Therefore, it can be expected that Anchorage and Alaska will continue to experience steady growth in personal income over the planning period. This signifies a robust economy.

3.1.2 Historical General Aviation Activity

This section presents a brief review of historical trends in various elements of aviation activity at LHD. Elements reviewed include annual aircraft operations and based aircraft. Additionally, summaries are provided for historical Alaskan aircraft registrations as well as pilot registrations locally, regionally, and nationally.

3.1.2.1 Aircraft Operations

Historical aircraft operations for LHD were acquired using multiple sources. These sources consisted of the 2013 AIAS Planning Study, the 2014 FAA Terminal Area Forecast (TAF), and the LHD ATCT records. According to the AIAS Planning Study, prior to 2010 the FAA counted ANC and LHD operations together, and subsequently estimated the breakout between ANC and LHD operations. In 2010, due to the potential for such procedures to produce skewed results, the ATCT returned to counting separate operations counts for ANC and LHD.

For this study, operations were divided into itinerant, local, and other categories, as shown in Table 3-3. This mirrors the breakout of aircraft within the AIAS Planning Study. As defined by the FAA, itinerant operations are performed by aircraft taking off and leaving the airport area or having arrived and landed after taking off from a different airport area. Conversely, local

operations remain within 20 miles of the ATCT of the airport from which they departed. The "other" category takes into account undetermined operations and the few operations that were counted as military and miscellaneous since the ATCT began tracking operations.

Table 3-3 provides available information regarding historical aircraft operations at LHD since 2004. Over the 10-year period, the total number of operations decreased from 2005 to 2008 then started to slowly increase, reaching 2004/2005 levels again by 2014. In 2014, there is a large uptick in local operations when compared to previous years. This is likely due to an increased accuracy in operational counts related to LHD resulting from the changes in ATCT operations recording practices and, as indicated by tenant interviews, an increase in sightseeing tours that depart and land at LHD.

Table 3-3: Historical Annual Operations

Year	Itinerant GA Operations	Local GA Operations	Other	Total Operations
2004	43,935	6,736	15,395	66,066
2005	42,852	6,729	19,921	69,502
2006	37,926	7,225	22,394	67,545
2007	38,382	5,346	20,124	63,852
2008	36,752	5,119	15,810	57,681
2009	38,486	7,399	12,291	58,176
2010	38,941	5,987	14,286	59,214
*2011	46,245	5,879	14,398	66,522
*2012	42,857	8,488	14,982	65,966
*2013	42,184	8,368	14,652	65,204
*2014	45,206	10,584	16,221	72,011
Average Annual Growth Rate				
2004-2014	0.3%	4.6%	0.5%	0.9%

Source: AIAS Forecast Technical Report 2013, Table 4.5 (Note "Other" category is undetermined operations. Difference between FAA counts of Air Carrier and Air Taxi operations and ANC counts of commercial operations.)
*LHD Tower Records, 2011-2014

3.1.2.2 Aircraft Operations Comparison – LHD and ANC

A comparative analysis of historical itinerant operations at LHD and ANC was completed to determine the correlations that exist between ANC and LHD operations and if this remains a reasonable metric to continue to use to compare forecasts between the two airports. For this purpose, itinerant general aviation (GA) operations and total operations were examined.

Table 3-4 details the percentage of LHD itinerant GA operations to ANC itinerant GA operations. As shown, the percentage of LHD to ANC itinerant GA operations remained fairly consistent from 2004 to 2014, with an average of 54 percent LHD to ANC. It should be noted that Table 3-4 shows significant differences in 2004 from the 2003 data reported in the 2006 Lake Hood and ANC General Aviation Master Plan. This is the result of the previously referenced alteration in operations reporting practices. Tables and figures for this chapter intentionally begin at 2004 to avoid confusion that would result from a change in the way information was recorded at the time.

Table 3-4: LHD/ANC Itinerant General Aviation Operations Comparison

Year	ANC	LHD	LHD / ANC (%)
2004	85,832	43,935	51%
2005	80,752	42,852	53%
2006	74,991	37,926	51%
2007	72,826	38,382	53%
2008	72,859	36,752	50%
2009	72,262	38,486	53%
2010	74,214	38,941	52%
2011	78,096	46,245	59%
2012	76,838	42,857	56%
2013	74,834	42,184	56%
2014	80,486	45,206	56%

Sources: 2015 FAA TAF (ANC 2004-2014), 2013 AIAS Forecast Technical Report (LHD 2004-2010), LHD Tower Records (LHD 2011-2014)

Table 3-5 details the percentage of LHD total operations to ANC total operations. Again, the percentages were fairly consistent from 2004 to 2014, with an average of 22 percent LHD to ANC operations.

Table 3-5: LHD/ANC Total Operations Comparison

Year	ANC Total Operations	LHD Total Operations	LHD / ANC Total Operations
2004	306,465	66,066	22%
2005	313,714	69,502	22%
2006	304,608	67,545	22%
2007	300,476	63,852	21%
2008	290,196	57,681	20%
2009	256,001	58,176	23%
2010	272,036	59,214	22%
2011	276,131	61,657	22%
2012	271,534	60,875	22%
2013	264,896	65,204	25%
2014	272,380	72,011	26%

Source: 2015 FAA TAF, 2013 AIAS Forecast Technical Report, FAA OPSNET, LHD Tower Records, 2014

The comparison analysis demonstrates a historical trend of LHD operations closely tracking ANC operations. This interrelationship between ANC and LHD was used in validating the AIAS Planning Study forecast and developing the forecast for this study.

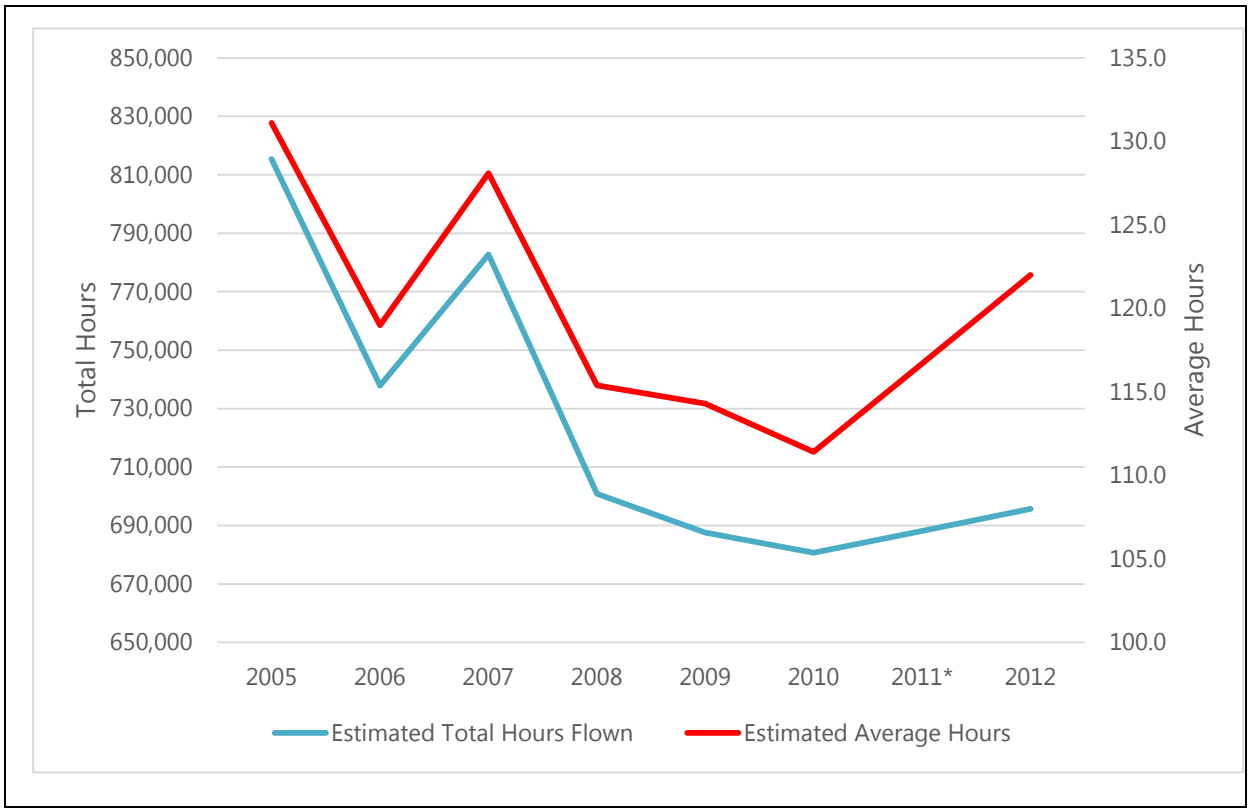
3.1.2.3 Aircraft Registrations

Aircraft registrations of general aviation and air taxi aircraft were compiled for the State of Alaska, as illustrated in Table 3-6. This data specifies how many aircraft are in the State and how many of those are actively flying. Additionally, the data estimates the number of hours that aircraft are being flown. Combined, these metrics are good indicators of general aviation and air taxi activity within the State. Table 3-6 shows that since 2005 the number of active aircraft has decreased slightly. However, Figure 3-1 shows that since reaching a low in 2010, the number of total hours flown has been increasing slowly. Likewise, the average number of hours flown per active aircraft has also been increasing. These trends point to a correlation of increased activity within the general nature of an improving economy.

Table 3-6: Alaska Aircraft Registration Population and Activity

	2005	2006	2007	2008	2009	2010	2011*	2012
Aircraft Population Size	8,815	8,845	8,874	9,061	9,034	9,079	8,739	8,399
Estimated Number Active	6,217	6,201	6,111	6,076	6,017	6,113	5,908	5,703
Estimated Percent Active	70.5%	70.1%	68.9%	67.1%	66.6%	67.3%	68%	67.9%

Source: Annual survey of GA and Air Taxi operators in the U.S., prepared by Tetratech for FAA.
Note: 2011 data held back to be reviewed. 2013 data not yet published, but has been compiled.
*2011 Data interpolated



Source: Annual survey of GA and Air Taxi operators in the U.S., prepared by Tetratech for FAA.
Note: 2011 data held back to be reviewed. 2013 data not yet published, but has been compiled.
*2011 Data interpolated

Figure 3-1: Alaska Registered Aircraft Hours Flown

3.1.2.4 Certified Pilot Population

Similar to aircraft registrations, the number of certified pilots within the region can be used to estimate aviation activity. Table 3-7 details the number of certified pilots residing in Anchorage along with calculations indicating changes in the pilot population over different periods of time. Between 2004 and 2014, the AAGR reflects that the Anchorage population has been growing while the number of certified pilots has been decreasing at a rate of 0.91 percent annually. Furthermore, the commercial pilot population has trended down at an even faster rate than the general pilot population. This trend signifies that population gains are not generating additional pilots to maintain current ratios. This is in line with other parts of the U.S. where the younger population growing up in the region are not becoming pilots at the same rate as previous generations.

Table 3-7: Anchorage Pilot Population

Year	Population	% Change	Pilots	% Change	Commercial Pilots	% Change	Pilots per 1,000 Pop	% Change
2004	276,865	1.7%	4,101	-1.3%	867	-2.3%	14.8	-2.9%
2005	277,157	0.1%	4,079	-0.5%	852	-1.7%	14.7	-0.6%
2009	289,230	4.4%	3,849	-5.6%	815	-4.3%	13.3	-9.6%
2014*	301,134	4.1%	3,741	-2.8%	673	-17.4%	12.4	-6.6%
AAGR 2004-2014	0.84%		-0.91%		-2.50%		-1.74%	

Sources: FAA, U.S. Census Bureau, and Alaska Department of Labor and Workforce Development.
*Population used for the 2014 calculation is 2013 population.
Data based on certified pilots include pilots with air transport, commercial, private, recreational, sport, and student licenses.

Table 3-8: Alaska Pilot Population

Year	Population	% Change	Pilots	% Change	Pilots per 1,000 Pop	% Change
2004	659,653	1.6%	8,616	-1.1%	13.1	-2.6%
2005	667,146	1.1%	8,550	-0.8%	12.8	-1.9%
2009	697,828	4.6%	8,286	-3.1%	11.9	-7.3%
2014*	736,399	5.5%	8,098	-2.3%	11.0	-7.4%
AAGR 2004-2014	1.11%		-0.62%		-1.71%	

Sources: FAA, U.S. Census Bureau, and Alaska Department of Labor and Workforce Development.
*Population used for the 2014 calculation is 2013 population.
Data based on certified pilots include pilots with air transport, commercial, private, recreational, sport, and student licenses.

Table 3-8 provides the details of historical pilot registrations in the State of Alaska, which have been decreasing at a rate of 0.62 percent annually. The State's trends are similar to those in Anchorage; an increase in population and decrease in pilots.

Table 3-9: United States Pilot Population

Year	Population	% Change	Pilots	% Change	Pilots per 1,000 Pop	% Change
2004	293,656,842	1.0%	587,172	-1.2%	2.00	-2.2%
2005	296,410,404	0.9%	576,944	-1.7%	1.95	-2.7%
2009	303,824,640	2.5%	566,821	-1.8%	1.87	-4.2%
2014*	316,148,990	4.1%	552,408	-2.5%	1.75	-6.3%
AAGR 2004-2014	0.74%		-0.61%		-1.34%	

Sources: FAA, U.S. Census Bureau, and Alaska Department of Labor and Workforce Development.
*Population used for the 2014 calculation is 2013 population.
Data based on certified pilots include pilots with air transport, commercial, private, recreational, sport, and student licenses.

The United States has also seen a decrease in the pilot population at an annual rate of 0.61 percent. This has impacted general and commercial aviation in all parts of the nation. In general, this trend is associated with the increased cost of flight training and aircraft operation which has dampened interest of younger generations from becoming pilots. Simultaneously, pilots of older generations are retiring from flying. Table 3-9 details the historical pilot registrations of the U.S. as a whole.

3.1.3 Review of Previous Studies

Inputs into the preparation of this forecast consisted of reviewing previous studies including the 2006 LHD Master Plan, the 2012 Merrill Field Airport Master Plan, the 2013 AIAS Planning Study, and the recently completed 2014 Anchorage International Airport Master Plan. The objective of reviewing these studies is to determine which of the assumptions used by them remain reasonable to be carried forward in the development of this Master Plan's forecast.

3.1.3.1 2006 LHD and ANC General Aviation Master Plan

The 2006 LHD and ANC General Aviation Master Plan (2006 Master Plan) included a detailed analysis and forecasting effort for both ANC and LHD as it related to general aviation activity. It provided a regression analysis based scenario and a based aircraft centered scenario to project aircraft operations at LHD. During this analysis the following assumptions were determined for the development of the forecast for aviation demand at LHD:

- No major economic downturn was anticipated. The assumption was that local, national, and international economies will periodically increase and decrease with the pace of growth in accordance with normal business cycles.
- Approximately 6.5 percent of LHD based aircraft use ANC runways. This percentage would remain constant over the forecast period.
- The number of based aircraft had remained fairly constant, and was assumed to remain constant over the forecast period. There were 709 aircraft on airport-owned spaces, and 340 aircraft on leased land for a total of 1,049 based aircraft at LHD.
- No major increase in tie down fees over the forecast period was anticipated.
- LHD would remain physically unconstrained, which meant that there are sufficient airfield and landside facilities at LHD to accommodate GA activity dictated by demand.

In conclusion, the forecast of general aviation aircraft operations was projected to increase between 0.7 percent and 1.3 percent per year over the forecast period (from 58,354 in 2003 to between 67,231 and 74,966 in 2023).

3.1.3.2 2012 MRI Master Plan

MRI is a general aviation airport within the Anchorage Bowl, and has been a key component of the Alaska aviation system since 1930. MRI is located 1.5 miles east of downtown Anchorage and 15 miles from LHD. The following assumptions were used when developing Merrill Field's aviation demand forecast:

- The population and employment estimates are adequate for preparing an aviation demand forecast.
- No policies that constrain aviation activity would be imposed on MRI.
- General aviation activity remains the dominant type of use at MRI.
- Military operations will continue to be approximately one percent of total aircraft operations.

In conclusion, the forecast of general aviation aircraft operations was projected to increase at 0.8 percent per year over the forecast period (from 128,628 in 2012 to 151,424 in 2023).

3.1.3.3 2014 ANC Master Plan

The 2014 ANC Master Plan used the 2013 AIAS Planning Study forecasts, and included general aviation forecasts for ANC. The AIAS Planning Study also included forecasts for LHD. The annual general aviation operations at ANC were forecast to grow at an average annual rate of 1.4% from 36,060 operations in 2010 to 47,713 operations in 2030.

3.1.3.4 2013 AIAS Planning Study

The 2013 AIAS Planning Study included forecasts for LHD air taxi and general aviation operations, as well as general aviation operations by type of aircraft. As always, aviation activity is greatly dependent on the future economic and operating environment.

The AIAS Planning Study analysis concluded the following:

- While the national economy had just begun to come out of a large downturn caused by the financial crisis of 2008, the assumption was made that the large amount of public

debt and anticipated reductions in government spending would result in a reduction of the rate of future economic growth.

- The period of rapid recovery experienced after previous downturns is less likely to occur.
- The economic forecasts assume that no new major economic downturn would occur. Local, national and international economies will periodically increase and decrease the pace of growth in accordance with business cycles.
- Aviation fuel prices are connected directly to crude oil prices, which were extremely volatile leading into the 2013 AIAS Planning Study. Fuel prices were an important determinant of aviation demand and were incorporated in AIAS Planning Study analysis.
- It was determined that the operating environment at LHD would not change; furthermore, changes in environmental, security and aviation regulations would not dramatically affect the aviation demand at LHD.

In conclusion, the aircraft operations forecast for LHD was estimated to increase from 59,214 in 2010 to 78,348 in 2030, an average annual increase of 1.4 percent.

3.1.3.5 Summary of Previous Studies

In summary, these previous studies were reviewed and their assumptions and conclusions were revalidated. Based on this review, it was determined that the general assumptions made in each of these previous studies were generally the same, and the average annual growth rate between them remained similar, ranging from 0.71 percent to 1.40 percent during their respective planning periods.

Furthermore, the 2013 AIAS Planning Study was accepted by the FAA and the Alaska DOT&PF, and was used as a baseline for the 2014 ANC Master Plan, 2014 FAI Master Plan, and the 2014 ANC Part 150 Noise Compatibility Study. While a few years have passed since the AIAS Planning Study forecast was completed, the factors driving LHD aviation activity have remained relatively unchanged. Therefore, it is appropriate for the 2014 LHD Master Plan to use the AIAS forecast

as a baseline. The socio-economic data relevant to LHD was updated and stakeholder interviews were conducted to validate the factors driving the aviation activity at LHD.

3.1.4 LHD Tenant Interviews

Along with the online surveys of tenants, users, and various stakeholders, in person and phone interviews were conducted with key tenants and representatives of LHD in order to validate the factors driving aviation activity at the Airport. These tenant and representatives included;

- Airport Management
- Air Traffic Control
- Fixed Base Operators
- Major Charter Tenants
- Alaska Airmen's Association
- Alaska Department of Commerce & Economic Development
- Alaska Department of Labor and Workforce Development
- U.S. Department of the Interior

The interviews provided qualitative inputs which were used to develop this forecast. The information gathered during these interviews was compiled and grouped into categories. It is important to note that some of the results are not relevant to or do not affect the development of an aviation demand forecast; nevertheless it is important to respect the integrity of the data collected and document it in its entirety. The following is a generalized summary of the information, broken out into five categories that best convey the general theme and results of those interviews:

- Air Taxi Demand
- Increase in Area Visitors
- Change in Air Taxi Services
- Decrease in Local Pilots
- Aviation Fuel Prices

3.1.4.1 Air Taxi Demand

Air taxi business is strong in Anchorage and in Alaska in general. Alaska tourism has been growing overall. While the demand for air taxi services is expected to continue growing, competition with other destinations is also increasing. The local Anchorage economy is flat and has slowed in the last year. The air taxi business that serves the lodges around the state do not necessarily follow the same trends as the cruise ship and commercial air carriers. There is a relatively high occupancy rate of lodges that generate the most enplanements for tour operators and which stay continuously booked regardless of the local economic conditions. This tends to support an increasing demand for flight tour operators.

3.1.4.2 Change in Air Taxi Services

Fly-in fishing in Southcentral Alaska has decreased somewhat because of smaller salmon runs. At the same time air taxi related traffic has grown for other types of tourist flights including glacier landings and dog sled tours. Sightseeing tours and contracts with lodges appear to be a major share of the business for air taxi operators. Weather can have a large impact on the number of operations and amount of business these air taxi operators receive and hence, is reflected in the fluctuation of enplanement records. Summer is by far the busiest time of the year, with July appearing to be the peak month.

Air taxi businesses at LHD have experienced difficulties acquiring pilots and aircraft sales are down. One tenant noted that many planes are listed for sale around LHD. The GA maintenance business has also slowed. Local operators do not plan on increasing the services they currently offer unless they can increase their fleet, but there are presently no existing plans to do so.

3.1.4.3 Increase in Area Visitors

Along with the increases in numbers of passengers to Anchorage, there are additional tourists that take advantage of LHD air taxi services. The one facet of the Alaska tourism industry that has exceeded expectations is the cruise industry. In 2014, there were approximately 30,000 more cruise passengers over the previous year than had been forecast. Some of this additional

growth may be attributed to the return of cruise ships docked at the Port of Anchorage in addition to the increased dockings at Seward and Whittier, which are the majority of dockings.

International traffic has increased as well, and efforts are being made to make entry by international travelers easier. It is anticipated that Anchorage will see three percent to five percent annual growth in the number of visitors to the area, with the amount of increased spending close to that.

3.1.4.4 Aviation Fuel Prices

Aviation fuel prices have recently leveled off. At this writing, the price gap between aviation fuel and vehicle fuel seems to be closing. Aviation fuelers on the Airport indicated that traffic is increasing.

The following are detailed numbers from AIG Fuel Sales for LHD, which provide further confirmation summer is the busiest time of the year:

- 63 average fuel sale transactions per day in summer (May-September), for approximately 9,500 sales in summer;
- 6 average sales per day in October and November, for approximately 370 sales;
- 10 average sales per day in December and January, for approximately 620 sales;
- 18 average sales per day in February and March, for approximately 1,062 sales; and
- 6 average sales per day in April, for approximately 180 sales.

Based on this data there were approximately 11,732 fuel sales during 2013. The average fuel sale was 40 gallons, which totaled approximately 469,280 gallons of fuel sold.

3.1.4.5 Tenant Interview Summary

The majority of aviation activity at LHD is driven by local and regional economic activities and visitors from the Lower 48 during peak season summer months.

Air taxi businesses, which are an important economic contributor at LHD and regionally, represent an area of continued growth activity. Air taxi operators at LHD focus primarily upon serving recreational passengers. Due to the widespread popularity of flightseeing in Alaska, the air taxi industry benefits both from persons who flightsee on day trips in association with cruises as well as from those who are attracted to Alaska from throughout the United States and the world for ecotours and experiencing the state's vast wilderness. Air taxi activity tends to be less affected than other types of aviation in the area, by the volatility historically associated with the oil and gas sectors of the economy. In addition, air taxi service providers at LHD have also been diversifying into more air travel opportunities for travelers who seek fishing, hunting, and the more remote experiences that Alaska offers. The combination of these factors has enabled air taxi operators to continue as a steady, viable business within the region.

Increasing costs associated with aircraft maintenance is a source of concern for LHD aircraft operators of small aircraft in the region. Much of the fleet operating at LHD is aging and expensive to operate. Replacement parts for some aircraft are becoming scarce due to older aircraft models no longer being produced. Replacement of these aircraft is often cost prohibitive. In some cases, it is not possible to replace the load carrying performance offered by the older generation aircraft as there are no new generation replacements in that category of aircraft. As these aircraft near their useful life expectancy, it is unclear how the aviation industry will evolve within the small utility aircraft niche.

3.2 Forecast General Aviation Activity

This section will present forecasts of aviation activity for LHD total general aviation aircraft operations. The based aircraft forecast will be determined as part of the facility requirements phase of this master planning process. The basis for these forecasts is a review of previous forecasts and extensive interviews with LHD tenants and users.

3.2.1 Revalidation of General Aviation Assumptions

One of the objectives of the LHD forecast was to evaluate previous forecasts and judge whether the assumptions presented in previous forecasts can be verified. This section identifies local and national emerging trends as a first step to provide some measure to gauge whether

previous forecasts are still valid. The next step is to identify previous forecast assumptions and evaluate them relative to current LHD trends.

3.2.1.1 Factors Affecting Air Traffic at Lake Hood

Some factors that affect air traffic at LHD are considered to be local or regional in nature while others are more national or worldwide. Some factors tend to increase demand for air travel, in contrast to others that tend to dampen demand. Several factors impact LHD directly while other factors impact the region surrounding LHD and the Anchorage area. Indirect impacts will likely filter through and affect LHD air traffic.

The following is a list of the factors that tend to indicate an increase in future aviation demand as well as a list of factors that suggest a decrease in future aviation demand.

Factors that Tend to Indicate an Increase in Demand for Air Travel:

- The population of the areas surrounding Anchorage continues to grow, and that trend is expected to continue. Increased population will increase demand for transportation services.
- Oil prices are falling, and many experts expect that trend to continue into the future. The price drop between 2014 and 2015 will moderate some in later years, but is still expected to be negative in terms of real (inflation-adjusted) dollars in the long term. Low fuel costs will positively impact air carriers in the region, and the lower costs may result in decreased air fares, which would tend to increase tourism and the demand for LHD air travel. Lower fuel prices may also generate an increase in private aircraft operations. In addition, fuel costs in rural Alaska will fall, providing more disposable income to rural residents that can be used for travel.
- The tourism industry in the Anchorage area has improved over the past several years, and is expected to continue growing into the future. Increased visitors to Anchorage will mean increased flight seeing, bear viewing, fishing, and other trips originating at LHD.

- The ecotourism and outdoor recreation sector in Alaska has been growing. As the national economy improves, recreational trips increase. Air activity associated with ecotours, recreational fishing and hunting, and remote lodge and cabin visits increase.
- Developing aviation technology is enabling flight in weather and light conditions that have in the past been marginal.

3.2.1.2 Factors that Tend to Indicate a Dampening in Demand for Air Travel

- While the worldwide economy is improving slowly, it is still susceptible to major upheavals and significant changes in direction.
- Continued tightness of the federal and state government budgets will continue to negatively impact education, health care and other institutions in Alaska, putting a strain on disposable income that can be used for transportation and recreation.
- According to an annual survey of general aviation and air taxi operators performed by the Federal Aviation Administration, the number of active general aviation and air taxi aircraft in Alaska has declined since 2000.

Table 3-10 shows that the number of certified pilots in Alaska, in general, and in the Anchorage area has declined in recent years whereas the number of operations have increased slowly since 2008. Tenants cite such factors as growth in air taxi operations and increased itinerant activity from the Lower 48 contributing to the slight increase in operations. Whether the lack of availability of certified pilots, especially for air taxi operators, stalls the trend for slow increases in total operations remains to be seen.

Table 3-10: Certified Pilots per 1,000 Population

Year	Anchorage Pilots Per 1,000 Pop	Alaska Pilots Per 1,000 Pop	U.S. Pilots Per 1,000 Pop
2000	15.6	13.6	2.1
2005	14.7	12.8	1.9
2009	13.3	11.9	1.9
2014	12.4	11.0	1.7

Sources: FAA, U.S. Census Bureau, and Alaska Department of Labor and Workforce Development.
*Population used for the 2014 calculation is actually 2013 population.
Data based on certified pilots include pilots with air transport, commercial, private, recreational, sport, and student licenses.

- In September of 2010, the FAA released recommendations for new regulations regarding flight, duty and rest time restrictions on commercial pilots. Those recommendations were implemented in 2014 and will likely result in higher costs for commercial operators. Additional regulations on commercial pilots have resulted in fewer pilots being trained. Consequently, qualified pilots are harder to find, and demand higher pay, increasing aviation costs overall and dampening demand for those services. In recent years the number of commercial pilots being certified has dropped dramatically, mainly due to the high cost of training programs and greater regulations. Fewer available pilots will likely increase the costs of commercial operators as they offer higher salaries to compete for the available pilots.
- Many of the aircraft used in Alaska for air taxi operations and general aviation operations are old and no longer manufactured. Replacement aircraft are much more expensive, and parts for the older aircraft are getting scarce. This will increase the cost of operating GA and air taxi aircraft in the future.
- Avgas is the only remaining lead-containing transportation fuel, and the U.S. Environmental Protection Agency has begun the regulatory process to transition away from that fuel type. Many older general aviation and air taxi aircraft will need some kind of replacement fuel for their piston engines, and while replacements are being developed, nothing has yet been approved. These changes may create negative impacts on the GA and air taxi operators in Alaska.

- Mining and mineral exploration activity (supported out of LHD) has slowed because of weakening metal prices. Projections for Pebble Mine are not positive. Actual employment in Alaska mines has leveled off and dropped slightly in the last year.
- Salmon runs have been poor in some parts of Southcentral Alaska in past years, and great improvement is not expected in the future. Fishing lodges depending on these fish runs for business may be experiencing declines in that business.
- Previous forecasts assumed the operating environment at LHD would not change and that changes in environmental, security and aviation regulations would not dramatically affect aviation demand at LHD. Some tenants expressed concern about LHD operating conditions that add to aircraft operating costs, namely lake weed proliferation, poor water quality, and shoreline erosion.

3.2.1.3 Assumptions Used Within the Forecast

Primary assumptions identified within previous forecasts were listed in Section 3.1.3. As a means of identifying assumptions best representing today's conditions at LHD, previous assumptions were combined and evaluated to determine their relevance for this forecast.

The following is the list of assumptions that will be used to generate forecasts for LHD. For the most part, these assumptions are the same as those identified by the LHD Master Plan and 2013 AIAS Planning Study.

- Growth in population for Anchorage, and Alaska as a whole, continues to increase at a faster rate than the total U.S.
- The PCPI continues to grow. The PCPI for Anchorage is greater than Alaska and Alaska outpaces the U.S. In the future, the projected growth rate in PCPI for Anchorage and Alaska will be about the same as for the U.S., resulting in the PCPI for Anchorage remaining higher than Alaska which will remain higher than the U.S.
- No major economic downturn is anticipated although there is concern that the tightness of the federal and state government budgets will put a strain on disposable income that can be used for transportation and recreation. Consequently, it is anticipated that the

rapid period of recovery experienced after previous deep downturns such as 2009-2010 is less likely to occur, resulting in a new norm of lower growth rates. At the same time and similar to the past, local, national, and international economies continue to fluctuate with normal business cycles.

- The number of based aircraft at LHD has remained fairly constant over the last 25 years (1991-2015), partly due to the scarcity of affordable developable land. The interest in floatplane slips has remained high, as demonstrated by a long standing waiting list. However approximately 65% of waitlist pilots currently accept a slip when offered one.
- Previous forecasts have used consistent long-term growth rates in general aviation operations. The 2006 Lake Hood and ANC General Aviation Master Plan forecasted general aviation aircraft operations would increase between 0.7 percent and 1.3 percent; the 2013 AIAS Planning Study estimated LHD operations would increase by an annual rate of 1.4 percent to 2030.
- Aviation fuel prices are connected directly to crude oil prices, which in the past have been extremely volatile. At least in the short term, oil prices are anticipated to stay lower in inflation-adjusted dollars.
- The number of active general aviation pilots in the U.S., Alaska, and in Anchorage continues to decrease.
- While the general aviation fleet in the U.S. is growing slowly, there is anticipated to be a very slow decline in all U.S. piston aircraft over the next 25 years.

3.2.2 Review and Update of Forecast Lake Hood Operations

The trends and assumptions outlined in Section 3.2.1 are used in the development of updated forecasts of LHD aircraft operations.

3.2.2.1 General Aviation Operations

There are several factors that tend to be positive in the outlook for the potential for slow growth in general aviation operations. The potential for increasing population, PCPI, an extended period of economic growth, and the general trend for increased general aviation

hours flown are positive indicators. This is supported by reasonable fuel prices that likely will stimulate general aviation operations activity.

Historic information for aircraft operations at LHD is somewhat inconsistent. For a period of time, the number of LHD aircraft operations were estimated as a proportion of overall activity between ANC and LHD. Certainly, there are different dynamics in the type of general aviation activity accommodated at both airports; therefore the potential for proportional changes may not always provide an accurate assessment. In recent years ATC has prepared separate air traffic counts for ANC and LHD.

One of the tasks of this forecast was to review assumptions of previous forecasts to ascertain whether or not those assumptions continue to be valid. The review concluded that the assumptions of previous forecasts are still valid. Prior forecasts used a similar annual growth rate for projections of LHD activity whether the baseline year was 2006 (LHD Master Plan) which forecast general aviation operations specifically for LHD or 2013 (AIAS Planning Study) that forecast general aviation operations for LHD in terms of a constant factor of 55.5 percent relative to the collective total for both LHD and ANC. The range of growth identified by the two studies is 0.7 percent to 1.4 percent annually. The FAA's Terminal Area Forecast (TAF) 2015 forecasts of general aviation operations is based upon 1.4 percent annual growth.

A second approach was taken to generate recent historical general aviation operations as a check. It was computed by using the 2014 ATC count of 72,011 operations for the baseline year and growing that number by the average annual growth rate in general aviation operations of 0.9 percent that is representative of the 10-year period 2004-2014 (see Table 3-3). And Table 3-11 provides the results.

Table 3-11: General Aviation Operations Forecast

Year	TAF/AIAS Forecast	ATC Counts
2014	62,592	72,011
2015	63,468	72,659
2020	68,036	75,988
2025	72,934	79,470
2030	78,185	83,111
2035	83,813	86,919
Average Annual Growth Rate		
	1.4%	0.9%

Based upon these two methods of identifying a forecast of general aviation operations, the number of general aviation operations for LHD in 2035 could be stated in a range from 84,000-87,000 annually.

Given the two forecasts are almost the same over the long term, this forecasts adopts use of the TAF/AIAS Forecasts for use in the LHD Master Plan.

3.2.3 Comparison to FAA Terminal Area Forecast (TAF)

The FAA TAFs are published on an annual basis for every airport in the United States that is included in the National Airspace System (NAS) for use in budgeting and planning by airport sponsors and the public at large. The forecast is based upon federal fiscal years. For airports with air traffic control towers, TAF traffic counts are derived from the recorded traffic counts in the Air Traffic Activity Data System (ATADS)[15].

3.2.3.1 FAA TAF Use in Airport Planning

The TAF is a primary source of information used by the aviation industry. The database provides a history of aviation activity covering about 50 years; 25 years history based on the ATADS and a 25 year projection. The TAF typically provides enplanement information and operations at a

[15] http://aspm.faa.gov/opsnet/sys/Main.asp?force=atads

given airport by general categories of aircraft such as air carrier, air taxi and commuter, general aviation, and military operations as well as includes a number for based aircraft.

The TAF is a very important planning tool for the FAA. Airport sponsors use the TAF to prepare their forecasts and the FAA applies the TAF when reviewing those forecasts. One use of the TAF is to review forecasts prepared by airport sponsors. In accordance with FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, paragraph 706.b(3), "The sponsor's forecast must be consistent with the Terminal Area Forecast (TAF). To be consistent with the TAF, the sponsor's 5-year forecast should be within 10 percent of the TAF and a 10-year forecast should be within 15% of the TAF."[16] The FAA must approve the forecasts before the forecasts can be used to prepare facility requirements in a master plan or before going forward with an environmental document that requires a forecast. If these stated thresholds are exceeded, the FAA Region office in which the airport is located will forward the forecasts to FAA Headquarters for approval.

3.2.3.2 Comparison of LHD and TAF Forecasts

The FAA TAF has become a primary source used by many airports across the U.S. as their forecast. The 2013 AIAS Study forecasts were adopted by the FAA and used in the TAF. These forecasts have been revalidated in this study.

This forecast adopts the TAF General Aviation Operations Forecast. The TAF forecasts were compared to a forecast that was developed using a 10-year operations growth rate of 0.9% for data 2004-2014, but using the ATC tower count of 72,911 operations for baseline year 2014. This figure is 9,419 operations greater than the 2015 TAF estimate for 2014. The difference in the two figures likely reflects the TAF's use of the proportional method of allocating total general aviation operations between ANC and LHD as opposed to using counts specific to LHD. Comparing the results of the two approaches, the five-year comparison indicates the 2014 ATC count forecast of 75,988 for 2020 is 11.7 percent greater than TAF and exceeds TAF tolerance

[15] December 23, 2004, memorandum from the FAA Director, Airport Planning and Programming, entitled *Revision to Guidance on Review and Approval of Aviation Forecasts*.

of 10 percent. However, the 10-year difference between the two forecasts is 9.0 percent, well within the FAA tolerance of 15 percent. At 20 years, the difference dips to 3.7 percent.

3.2.4 Comparison to 2013 AIAS Planning Study

The AIAS Planning Study forecast was completed in 2013 but used base data from 2010. FAA TAF forecasts and AIAS Planning Study forecasts for LHD aircraft operations are the same.

Earlier in the forecast, the issue of verification of assumptions was discussed. The preparation of a forecast for LHD placed emphasis upon the information gained during the interviews as well as updating of socioeconomic and operational data from the AIAS Planning Study. From the research, it was determined the assumptions that went into preparation of the AIAS Planning Study are still applicable today. When applying those assumptions after data was updated, the AIAS Planning Study forecasts of general aviation operations remain reasonable. Having accepted the forecast assumptions as reasonable, these LHD forecasts are the same as the AIAS Planning Study.

As mentioned at the onset of the study, forecasts are used for development of facility requirements. Each 5-year increment in the forecast is instructive to gauging facility needs at any given time. However, the far planning horizon data, in this case the 2035 forecast, is the one used to size the envelope required for facilities requirements. Whether the 2014 TAF/AIAS forecast is used as a baseline or the actual 2014 ATCT counts are used as a baseline, both projections are practically the same in the long-term (see Table 3-11).

3.2.5 Summary and Conclusion

These forecasts verify the assumptions used by the AIAS Planning Study and adopt the FAA TAF forecasts for use in master planning for LHD. A summary of the aviation demand forecast for aircraft operations are provided in Table 3-12.

Table 3-12: Forecast Summary

Description	2015	2020	2025	2030	2035	AAGR (2015-2035)
Aircraft Operations						
Air Taxi and Commuter	15,307	16,409	17,590	18,857	20,214	1.4%
General Aviation Itinerant	47,568	50,992	54,663	58,599	62,817	1.4%
General Aviation Civil	592	635	681	730	782	1.4%
Total Annual Aircraft Operations	63,468	68,036	72,934	78,185	83,813	1.4%

LHD is the largest SPB in the U.S. and has long provided unique aviation services for Alaskans and visitors to the region. Air taxi operators continue to grow very slowly but have a consistent customer base that is largely tourists, partly mining, and partly air service to remote Alaskan settlements that can only be reached by air. These operators share similar long-term challenges. General aviation aircraft pilots, aging aircraft, higher cost of maintenance and operation, and potential changes in legislation could affect an air taxi's ability to operate their aircraft when challenges arise such as new regulations pertaining to avgas. All in all, these trends point to slow growth in activity levels over time. The trends are reflected in the forecasts – slow growth in air taxi and general aviation aircraft operations over the next 20 years.

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4.0 FACILITY REQUIREMENTS

The purpose of the Facility Requirements chapter is to define the existing and future development needs for LHD. LHD needs defined here are based on an evaluation of whether the current facility meets FAA standards, maintenance needs for existing facilities, facility expansion needs driven by current and future demand, and issues and needs identified by users, airport staff, the FAA, and other stakeholders. The facility requirements analysis begins with a discussion of the design aircraft. This is the critical aircraft that drives LHD design standards, safety zones, separation between facilities, and overall facility layout.

4.1 Design Aircraft

This section identifies the design aircraft and associated facility requirements, in accordance with FAA planning guidelines. The critical design aircraft for LHD water and land facilities has been, and will remain, the De Havilland Beaver (DHC-2). This aircraft is the largest aircraft operating from LHD with over 500 annual operations. Other larger aircraft sometimes use LHD, but less frequently, or they are based at LHD but land and takeoff at ANC. The Beaver falls into FAA Aircraft Approach Category (AAC) “A”, having an approach speed less than 91 knots, and Airplane Design Group (ADG) “I”, with a wingspan below 49’ or tail height below 20’. All land based “on-shore” facilities should follow these A-1 requirements. However, as explained later in this chapter, water-based facilities do not follow the same FAA standards as land-based facilities and instead are guided by FAA’s Seaplane Base Advisory Circular AC 150/5395-1A. Additional characteristics of LHD and performance specifications for the De Havilland Beaver can be found in Table 4-1.

Table 4-1: LHD and Design Aircraft Specifications

LHD Characteristics	
Airport Elevation	79.93' MSL
Average Max Temp (Hottest Month)	65˚ F - July
Prevailing Wind (Sep-May)	N - NE
Prevailing Wind (May-Aug)	SE - WNW
Design Aircraft Characteristics	
De Havilland Beaver (DHC-2)	
Aircraft Approach Category (AAC)	A
Airplane Design Group (ADG)	I
Cockpit Crew	1
Seating Capacity	6
Length	30' 3"
Height	9' 0"
Wingspan	48' 0"
Wing Area	250 ft^2
Main Gear Width (MGW)	9' 0"
Empty Weight	3,000 lb
Gross Weight	5,100 lb
Useful Load	2,100 lb
Design Aircraft Performance	
Maximum Speed	158 mph
Cruise Speed	143 mph
Range	455 mi
Service Ceiling	18,000 ft
Rate of Climb	1,020 ft/min

SOURCE: Donald, David, ed. The Encyclopedia of World Aircraft. Etobicoke, Ontario: Prospero Books, 1997.

4.2 Airfield Capacity

Airfield capacity is an estimate of the number of aircraft operations a runway can handle without an unacceptable level of delay. When demand begins to approach capacity, unacceptable delays can occur. Factors affecting capacity can include runway configuration, ATC procedures, weather conditions, and fleet mix.

FAA Advisory Circular 150/5060-5 *Airport Capacity and Delay,* contains capacity estimates for various airfield layouts and fleet mixes. This Advisory Circular estimates an annual capacity of 230,000 aircraft operations and an hourly capacity of 98 visual operations for an airfield similar

to LHD. Total annual LHD operations reached 63,468 in 2015 and are projected to grow slowly through the planning period to reach a maximum level of roughly 84,000 operations by 2035, far below the 230,000 capacity estimated in the Advisory Circular. Therefore LHD's runway and waterlanes have adequate capacity through the 2035 planning period.

This conclusion was also supported in the 2006 LHD Master Plan and by the survey of Airport users completed as part of this Master Plan. The 84,000 operations forecasted for 2035 are also less than the peak levels of LHD operations in the 1980's and 1990's, when LHD capacity was not considered a problem.

4.3 Runway 14-32

This section addresses the ability of Runway 14-32 to meet FAA design standards for the A-I design aircraft described in Section 4.1.

4.3.1 Runway Length, Width, and Surface

Some considerations when determining appropriate runway length include airport elevation, prevailing winds, average maximum temperature for the hottest month, and design aircraft performance at maximum operating weight. A runway length analysis was modeled using FAA airport design software to determine the runway length requirements for various aircraft configurations shown in Table 4-2. This analysis indicates that the present runway length of 2,200 feet is adequate to meet current and future operational demand for approximately 75 percent of all small airplanes with less than 10 passenger seats. Aircraft requiring a longer runway can use ANC. Runway 14-32's 75 foot width exceeds the 60 foot width recommended for A-I aircraft.

Table 4-2: Runway Length Analysis

Aircraft Category	FAA Recommended Runway Length
Runway 14-32	
Small airplanes with approach speeds of less than 30 knots	300'
Small airplanes with approach speeds of less than 50 knots	810'
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	2,270'
95 percent of these small airplanes	2,800'
100 percent of these small airplanes	3,320'
Small airplanes with 10 or more passenger seats	3,840'

FAA Airport Design Microcomputer Program 4.2D

Runway 14-32 should continue to have a gravel surface because most aircraft using the runway are small aircraft that are configured for gravel. LHD aircraft requiring longer runways and/or paved surfaces for takeoff and landings are able to use ANC.

The 2006 LHD Master Plan evaluated Runway 14-32's length, width, and surface type, including alternatives to expand, upgrade, and realign the runway. That study agrees with the above conclusions to maintain Runway 14-32's current length, width and surface type.

4.3.2 Runway Separation and Safety Standards

Separation standards are established by the FAA with the purpose of preventing conflicts between two aircraft passing on surfaces such as runways and taxiways. Runway 14-32 currently meets FAA runway separation standards, which require 125 feet from the runway centerline to the hold lines on Taxiway H1, H2, H3, and H4 connectors. The Runway 14-32 centerline to Taxiway H centerline separation meets the 150' FAA required minimum and the distance from runway centerline to the adjacent aircraft parking is well over the 125 foot requirement. A Building Restriction Line (BRL) indicates where buildings must not be located in relation to aircraft movement areas. The existing 265 foot BRL meets FAA design guidance and there are no structures impeding the BRL for Runway 14-32. However, the future BRL should be located so that future construction such as buildings, or other facilities, on the west side of Runway 14-32 should not block the air traffic control tower staff's view of Runway 14-32 operating environment, such as the runway, short final, taxiway connector hold lines, etc.

4.3.3 Runway Protection Zones

The FAA has identified land use standards for Runway Protection Zones (RPZ). An RPZ is an imaginary trapezoidal area extending beyond the runway ends that serves to protect people and property on the ground in the event an aircraft lands or crashes beyond the runway ends. FAA Advisory Circular 150/5300-13A *Airport Design* states, "It is desirable to clear the entire RPZ of all above-ground objects. Where this is impractical, airport owners, as a minimum, should maintain the RPZ clear of all facilities supporting incompatible activities." Examples of incompatible uses include buildings, recreation uses, roads and parking, fuel and hazardous material storage, and above ground utilities.

Several incompatible land uses in Runway 14-32 RPZ's were identified in the previous 2006 Master Plan, including residences and other structures that previously existed within the northern portion of the Runway 14 RPZ. These structures have been acquired and removed, bringing the Runway 14 RPZ into compliance with FAA standards. However, incompatible uses within the Runway 32 RPZ still remain. The end of Runway 32 contains Lakeshore Drive and a portion of the peninsula finger roads, small storage structures and aircraft parking areas. The FAA's guidance on land uses within RPZ's recommends avoiding introducing new or modifying/expanding existing incompatible land uses within an RPZ and removing or mitigating the incompatible uses, if practical. The LHD Master Plan should consider ways to remove or mitigate Lakeshore Drive, the finger roads, and small storage structures within the Runway 32 RPZ.

Additional characteristics regarding the runway geometry can be found in Table 4-3.

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Table 4-3: Runway 14-32 Requirements

Runway	FAA Design Standard	Existing Condition	Compliance Condition If Met (☒)
Runway 14-32 (Visual)	**FAA A-I Small Aircraft**		
Runway Length	2270' – 75% of small airplanes	2200'	☒
Runway Width	60'	75'	☒
Runway Shoulder Width	10'	10'	☒
Runway Safety Area Width	120'	120'	☒
Runway Safety Area Length Beyond RW End	240'/240'	240'/240'	☒
Obstacle Free Zone Width and Length	250'/2600'	250' x 2600'	☒
Runway Object Free Area Width	250'	250'	☒
Runway Object Free Area Length Beyond RW End	240'/240'	240'/240'	☒
Runway Protection Zone Length	1000'	1000'	With Incompatible Uses
Runway Protection Zone Inner Width	250'	250'	With Incompatible Uses
Runway Protection Zone Outer Width	450'	450'	With Incompatible Uses
Runway Separation, Runway centerline to:			
Holding position	125'	125' (H1-H4)	☒
Parallel taxiway/taxilane centerline	150'	169'/150' (shifts)	☒
Aircraft parking area	125'	200'	☒
Building restriction line	265'	265'	Confirm Tower Line of Sight

Sources: FAA AC 150/5300-13A, 2006 Lake Hood Airport Master Plan, RS&H Analysis 2015

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4.4 Waterlanes

FAA guidance on water facility design is less prescriptive than land facilities. The FAA recognizes that floatplanes have unique operational and facility requirements which differentiate them from traditional ground-maneuvered aircraft. Floats create additional weight, drag, and spatial requirements for takeoff compared to wheeled aircraft. Maneuvering aircraft on water is also more cumbersome and requires additional space, especially in windy conditions. Floatplanes often use ramps to transition from water to land and vice versa and typically park on shorelines or floating docks versus paved parking aprons. Some aircraft fitted with skis operate on the frozen lakes during the winter. The off-shore facilities serving floatplanes at LHD consist of waterlanes (also known as sea lanes) for landing and takeoff, taxi channels to move between landing and parking areas on the Lakes, and floatplane ramps for transitioning between water and land parking areas. Waterlane dimensions, orientation, and geometry at LHD are discussed further below.

Waterlanes are designated takeoff and landing areas for floatplanes. LHD has three waterlanes designated as E-W, N-S, and NW-SE. The FAA provides minimum design recommendations in Advisory Circular 150/5395-1A: *Seaplane Bases,* for waterlane length, width, and water depth. This Advisory Circular (AC) was updated in 2013. During the preparation of this Master Plan, the Alaska Region Airports Division of the FAA and planning staff in FAA Headquarters concluded that some aspects of this 2013 AC need to be changed, as certain design standards did not appear to be realistic and practical in some cases or applicability of certain standards used on land runways, such as Runway Visibility Zone and Runway Protection Zones, were not even addressed in the 2013 AC. Therefore, with guidance from the FAA Airports Division, this master plan has applied the 2013 AC as broad guidance rather than a firm mandate, and some aspects of the 2013 AC are not being strictly applied for LHD water facilities. The FAA expects that the Seaplane Base 2013 AC will be updated sometime in the next few years, after which some aspects of these facility requirements may need to be reevaluated.

Previous FAA AC guidance published in 1994 recommended that water operating areas be “at least 2,500’ by 200’…to accommodate a sea lane 2,500’ by 100’ with a 200’ diameter turning

basin at each end." Depths of 6 feet were preferred but minimums of 3 feet were determined adequate for operating single-engine aircraft. The 2013 AC recommends minimum design standards that depend on the type and frequency of operations. Waterlane length recommendations are based on ideal conditions at sea level with a standard temperature of 59˚F. These newly recognized operational categories are listed from least to most intensive in Table 4-4 below.

Table 4-4: Current (2013) Seaplane Base Advisory Circular Recommended Waterlane Dimensions

Minimum Length	Minimum Width	Minimum Water Depth	Remarks
2,500'	200'	3' *	Minimum for limited seaplane operations
3,500'	300'	4' *	Minimum for limited commercial operations
5,000'	500'	10'	Minimum for extensive commercial operations
10,000'	700'	15'	Generally unlimited

* Minimum depth of 3' is adequate for single-engine operations but 6' is preferred.

Table 4-5 compares LHD's existing waterlane conditions against the previous FAA design standards and the 2013 AC update's design standards. Again, it should be stressed that the FAA Alaska Region has advised airport staff to use these standards as guidelines, until such time as the 2013 Seaplane Base AC is updated. Based on discussions with the FAA, the current LHD waterlane lengths and widths are adequate and do not need to be expanded to meet the current 2013 Seaplane Base AC standards. Waterlane lengths and widths may need to be reexamined after the 2013 AC is updated.

Table 4-5: Waterlane Requirements

Waterlane	1994 SPB AC Recommendation	2013 SPB AC Recommendation	Existing Condition	Compliance Condition If Met (☒)
E-W Waterlane (Visual)	-	**Extensive Commercial**		
Waterlane Length	2,500'	5,000'	4,541'	Meets 1994 AC and 2013 AC Minimum Waterlane
Waterlane Width	100' (200' operating area)	500'	188'	Meets 1994 AC and 2013 AC Restricted Waterlane
Minimum Waterlane Depth	3'/6'	10' (3' - 6' single engine ops)	6' - 23' Range	Meets 1994 AC and 2013 AC Single Engine Ops
Runway Protection Zone Length	-	-	1000'	N/A
Runway Protection Zone Inner Width	-	-	250'	N/A
Runway Protection Zone Outer Width	-	-	450'	N/A
Turning Basins	200'/200'	200'/200'	<200’	Define 200’ Turning Basins
N-S Waterlane (Visual)	-	**Limited Sea Plane**		
Waterlane Length	2,500'	2,500'	1930'	Does Not Meet 1994 and 2013 ACs
Waterlane Width	100' (200' operating area)	200'	200'	☒
Minimum Waterlane Depth	3'/6'	3'/6'	8' - 21' Range	☒
Runway Protection Zone Length	-	-	1000'	N/A
Runway Protection Zone Inner Width	-	-	250'	N/A
Runway Protection Zone Outer Width	-	-	450'	N/A
Turning Basins	200'/200'	200'/200'	200’/200’	☒
NW-SE Waterlane (Visual)	-	**Limited Sea Plane**		
Waterlane Length	2,500'	2,500'	1369'	Does Not Meet 1994 and 2013 ACs
Waterlane Width	100' (200' operating area)	200'	150'	Meets 1994 AC and 2013 Restricted Waterlane
Minimum Waterlane Depth	3'/6'	3'/6'	8' - 21' Range	☒
Runway Protection Zone Length	-	-	1000'	N/A
Runway Protection Zone Inner Width	-	-	250'	N/A
Runway Protection Zone Outer Width	-	-	450'	N/A
Turning Basins	200'/200'	200'/200'	<200’	Define 200’ Turning Basin

Sources: FAA AC 150/5395-1A, 2006 Lake Hood Master Plan, RS&H and DOWL Analysis

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4.4.1 E-W Waterlane

The E-W Waterlane is the most heavily used waterlane and is estimated by the FAA air traffic control tower to handle roughly 75% of all floatplane operations. The waterlane is 4,541 feet long and 188 feet wide and does not meet the current 2013 AC's recommended 5,000 length and 500 foot width for extensive commercial operations. However, it does meet the 2,500 foot minimum waterlane standard, the Restricted Waterlane width standard, and the standards in the 1994 AC as noted above. The FAA has advised that the current waterlane length and width may continue, pending an update to the 2013 AC. FAA 2013 AC guidance recommends a 200' diameter turning basin at the end of each waterlane. The existing turning basins are 188' wide and should be expanded to 200'.

Water depths for the E-W Waterlane vary from 6 feet to 23 feet deep. The shallowest depths occur along the dredged channel connecting the two lakes. Most of the waterlane exceeds the 10 foot depth recommended in the 2013 AC for waterlanes serving extensive commercial operations; however, some areas are less than 10 feet deep. LHD users have not expressed concerns about waterlane depth. As noted above for waterlane length and width, the waterlane depth requirement will be reexamined in a future AC update.

4.4.2 N-S Waterlane

The N-S Waterlane is the least used waterlane and is estimated by the FAA air traffic control tower to handle roughly 1% of all floatplane operations. The current FAA AC advises a minimum length of 2,500 feet, which the current length of 1,930 feet fails to meet. However, as noted above, the FAA has advised that the current waterlane length and width may continue, pending an update to the 2013 AC. The depth of the waterlane is adequate, at a range of 8 feet to 21 feet.

4.4.3 NW-SE Waterlane

The NW-SE Waterlane is the second most heavily used waterlane and is estimated by the FAA air traffic control tower to handle roughly 24% of all floatplane operations. The NW-SE Waterlane has a width of 150 feet, which is 50 feet below the 200 feet minimum of the 2013 AC

but it does meet the width for a Restricted Waterlane and the width in the 1994 AC. The 1,369 foot length is below the AC's recommended 2,500 feet. However, as noted above, the FAA has advised that the current waterlane length and width may continue, pending an update to the 2013 AC. A 200' turning basin should be defined on the north end, but there is not sufficient room for a standard turning basin on the south end where the waterlane overlays other waterlanes. The depth of the waterlane is adequate, at a range of 8 feet to 21 feet, given its lower level of operations.

4.4.4 Waterlane Runway Protection Zones

SPB requirements for waterlane RPZ's are not defined in the SPB 2013 AC. The FAA has advised that if the waterlanes are marked in the future, RPZ's may apply to the end of each waterlane (pending confirmation in an updated 2013 AC). Several buildings are located within a future RPZ on the west end of the E-W Waterlane and within the NW-SE Waterlane future RPZ. It is not practical to relocate existing structures within the RPZ's given the amount of investment in these structures. Shortening the waterlanes to meet potential RPZ standards is not practical, given that the waterlanes do not meet length standards defined in the current 2013 AC. Also, the current waterlanes are a rough representation of where aircraft takeoff and land. In reality, aircraft takeoff and landing areas on the water change from flight to flight based on prevailing winds and the location of other aircraft taxiing on the water. Therefore, the waterlanes and any future RPZ's should be viewed as general representations rather than precise locations. While existing structures may remain, the FAA has recommended that the Airport ensure that future development within the RPZ's not increase the level of incompatibility over what exists today.

4.4.5 Runway Visibility Zone

A Runway Visibility Zone (RVZ) is an area near the ends of intersecting runways or waterlanes that should be kept clear of objects so that pilots can see aircraft on other runways and waterlanes. The southern end of the Commercial Finger, lease areas on the south shore of Lake Hood, and the west end of Gull Island are all within the waterlane's RVZ. However, runway visibility can be safely managed where there is an air traffic control tower staffed with personnel 24 hours/day. The airport should consider requesting a modification of standards for

the LHD waterlanes runway visibility issue, as recommended in the 2006 Lake Hood Master Plan and ALP.

4.4.6 Part 77 Surfaces

Part 77 surfaces do not currently apply to LHD's waterlanes because the waterlanes are not marked. However, if the waterlane thresholds are proposed to be marked in the future, Part 77 surfaces would apply to each marked waterlane. Also, it should be noted that the current waterlanes are a rough representation of where aircraft takeoff and land. In reality, aircraft takeoff and landing areas on the water change from flight to flight based on prevailing winds and the location of other aircraft taxiing on the water.

Preventing incompatible land uses within and beyond LHD property is important to the safety of aircraft operations. The Airport should continue to work with the Municipality of Anchorage (MOA) to prevent incompatible land uses through the use of MOA code and other means. This could include adoption of a Part 77 map with height zoning for off-Airport property. Displaying Part 77 surfaces (even if not currently applicable) provides a mechanism to better protect the LHD against potential future obstructions.

Marked waterlanes with Part 77 surfaces allows the Airport, FAA, and the Municipality of Anchorage to protect the LHD airspace against unwanted obstructions. Pending a change to the SPB 2013 AC, the FAA has advised that the prior AC's 20:1 waterlane approach surfaces be continued at LHD rather than applying the more stringent 40:1 surface recommended for commercial operations in the current SPB AC.

4.5 Taxiways and Taxilanes

Taxiways and taxilanes are land-taxi surfaces at LHD that provide aircraft with safe and efficient transitions from lease lots and tie down areas to runways. Airplane Design Group (ADG) dimensions are used to create safe aircraft taxi routes. The FAA sets standards for width, safety areas, and object free areas along with appropriate geometry for turns and intersections. An emphasis is put on identifying and reducing potential areas of conflict referred to as "hot spots." The taxiway fillets (turning geometry) are determined through the Taxiway Design

Group (TDG), which is based on the Main Gear Width (MGW) of the design aircraft. LHD taxiway fillet design is based on the De Havilland Beaver which has a 9 foot MGW and falls under the 1A TDG. Table 4-6 provides the FAA's recommended design standards for taxiways and taxilanes, compares them to LHD's existing taxiways and taxilanes, and identifies deficiencies.

Table 4-6: Taxiway and Taxilane Requirements

Taxiway/Taxilane	Applicable FAA Standard	Existing Condition	Compliance Condition If Met (☒)
Taxiway Hotel	**A-I Small Aircraft**		
Width	25'	25'	☒
Taxiway Safety Area	49'	49'	☒
Taxiway Object Free Area	89'	60'	Deficient
Hotel 1 Connector	**A-I Small Aircraft**		
Width	25'	25'	☒
Taxiway Safety Area	49'	49'	☒
Taxiway Object Free Area	89'	89'	☒
Hotel 2 Connector	**A-I Small Aircraft**		
Width	25'	69'	☒
Taxiway Safety Area	49'	49'	☒
Taxiway Object Free Area	89'	89'	☒
Hotel 3 Connector	**A-I Small Aircraft**		
Width	25'	63'	☒
Taxiway Safety Area	49'	49'	☒
Taxiway Object Free Area	89'	89'	☒
Hotel 4 Connector	**A-I Small Aircraft**		
Width	25'	70'	☒
Taxiway Safety Area	49'	49'	☒
Taxiway Object Free Area	89'	89'	☒
Taxiway Echo	**A-I Small Aircraft**		
Width	25’	25’	☒
Taxiway Safety Area	49’	49’	☒
Taxiway Object Free Area	89’	89’	☒
Taxilane V	**A-I Small Aircraft**		
Width	25'	50'	☒
Taxilane Safety Area	49'	49'	☒
Taxilane Object Free Area	79'	79'	☒
Lakeshore Taxilane	**A-I Small Aircraft**		
Width	25’	25’	☒
Taxilane Safety Area	49’	49’	☒
Taxilane Object Free Area	79’	89’	☒

Taxiway and taxilane safety areas (TSA) reduce the risk of damage to aircraft deviating from the main taxiway surface (Figure 4-1). The taxiway and taxilane Object Free Areas (OFA) maintain clear areas around taxiing aircraft that prohibit vehicle service roads, parked aircraft, and other objects (with the exception of necessary air or ground navigation facilities). Taxiway object-free area clearances are based on wingtip clearances when aircraft are moving along a marked centerline and are also based on the ADG.

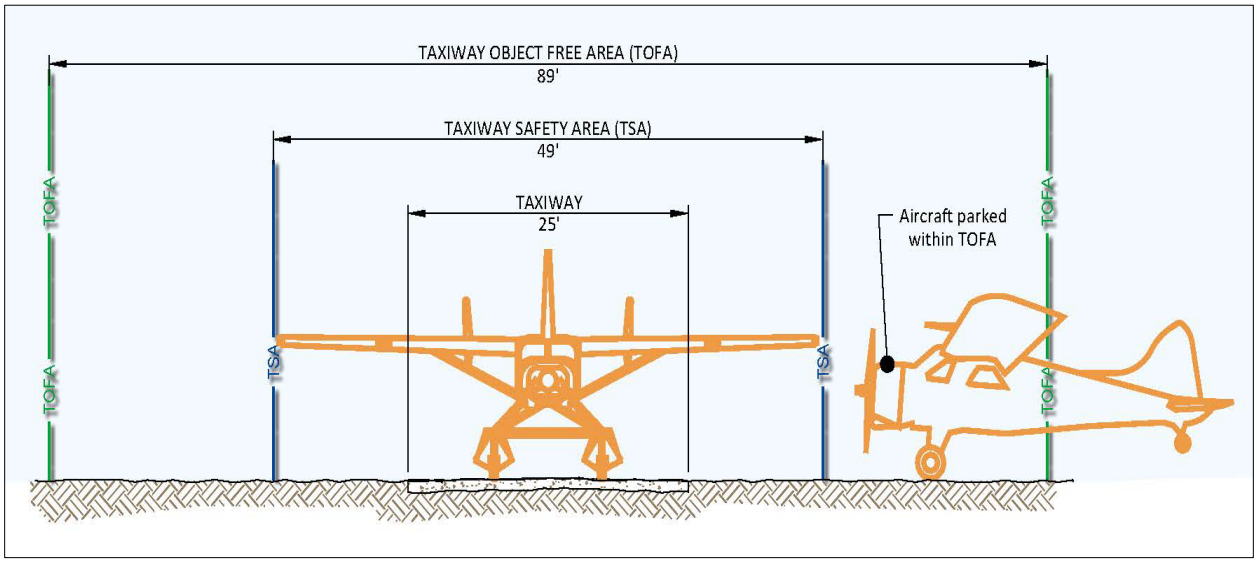

Figure 4-1: Taxiway, Taxiway Safety Area, and Taxiway Object Free Area Standards for A-1 Aircraft

4.5.1 Taxiway H and Connectors

Taxiway H runs parallel to Runway 14-32 and is connected to the runway via the Taxiways H1, H2, H3, and H4 connectors. The southern end of Taxiway H past Taxiway H3 shifts toward the runway in order to avoid the adjacent parking area, though parked aircraft do park within the 89 foot wide taxiway OFA on this southern end. This design is contrary to FAA requirements which call for standard angles, straight lines along taxiways and intersections, and taxiway OFA's clear of parked aircraft. Taxiway H should be straightened and parked aircraft should be relocated away from the taxiway OFA.

The connectors to Taxiway H are all paved and vary in dimension and orientation. Taxiway H3 seems to have been oriented to allow for a quick exit to parking when landing on Runway 14.

The angle of Taxiway H3 should be realigned to 90 degrees, which is standard to all the other runway/taxiway intersections and recommended by FAA AC's.

4.5.2 Taxiway E and Taxilane V

Taxiway E serves the Echo Parking and lease lot area and meets FAA design standards.

Aircraft requiring a paved landing surface can taxi over to ANC runways via Taxilane V where they can use ANC's longer paved runways, instrument approaches and other amenities. Consistent with the 2006 Master Plan, Taxilane V will continue to link LHD to the ANC airfield. This taxilane meets FAA design standards and will continue to be a critical connection for A-I aircraft that use LHD services but require paved surfaces or instrumented runways for takeoffs and landings.

4.5.3 Lakeshore Taxilane

Lakeshore Taxilane is a primary taxilane at LHD that connects businesses and permit areas to most of the other facilities at LHD and ANC. Proper TSA and OFA clearances are provided along Lakeshore Taxilane, but because adjacent lease lots and permit area boundaries are not marked, there is potential for aircraft and vehicles to park within the OFA. It would be prudent to mark the lease and permit area boundaries to maintain a clear OFA along this important taxilane that connects the entire western side of LHD.

4.5.4 Lakeshore Drive, Fingers, Enstrom Circle, Vought Circle (Shared Use Roads)

Lakeshore Drive, the roads serving the fingers south of Lakeshore Drive, Enstrom Circle, and Vought Circle are all shared use roads which are sometimes used by taxiing aircraft. Because of the higher volume of automobiles, aircraft, and pedestrians using Lakeshore Drive and the Commercial Finger, there is an increased probability of safety hazards from interactions with these 3 types of users on the roads.

Lakeshore Drive is one of the busier vehicle access routes at LHD. It also sees considerable pedestrian and bicycle traffic. Aircraft taxi on Lakeshore Drive from the fingers to Runway 14-32. Sections of Lakeshore Drive also have poor line of sight. If Lakeshore Drive was only a

taxilane, the pedestrian route would be within the taxilane OFA. Some pedestrians and vehicle operators are unfamiliar with operating among aircraft and may be unfamiliar with LHD, adding to safety concerns. Many pilots who completed the master plan survey expressed concerns about the aircraft/automobile/pedestrian conflicts in this area. The master plan should consider ways to increase separation of aircraft, automobiles and pedestrians on the section of Lakeshore Drive north of the fingers.

Floatplane Drive is a paved road that allows vehicles and aircraft to access leases and permits on the Commercial Finger. Because of the presence of leaseholds that serve the general public, this road is travelled by members of the public who may be unfamiliar with aircraft activity on the road. Prior airport plans have proposed to upgrade this road to a parallel road and taxilane, and adequate space already appears to be in place between the lease lots and slips to allow for a taxilane object free area. The master plan should consider improved separation of aircraft and automobiles on Floatplane Drive.

The non-commercial fingers, Vought Circle, and Enstrom Circle also see some use by taxiing aircraft and automobiles, though to a lesser extent than Lakeshore Drive and the Commercial Finger. Leases and slips in these areas are predominantly oriented toward floatplanes and ski planes operating on the lakes. The non-commercial fingers are closed to pedestrians and unauthorized vehicles. Space on the non-commercial fingers is limited, slip boundaries are not marked, and slip permittees' parked aircraft and structures sometimes restrict space for taxiing aircraft. The master plan should evaluate measures to improve the separation of aircraft and automobiles on these roads and widen the space available for taxiing aircraft. Because of the lower level of traffic and the predominance of use by aviators who are familiar with operating within a mix of aircraft and autos, the concern about conflicts is less than for Lakeshore Drive and the Commercial Finger.

Occasionally wheeled aircraft also taxi on Enstrom Circle and Vought Circle, two short paved roads on the south shore of Lake Hood. Leases and slips in this area are primarily oriented toward floatplanes and the Alaska Aviation Heritage Museum so aircraft taxiing is minimal. The Airport should make sure that parked aircraft and vehicles and structures remain on lease

property and slips to keep the road corridor open for occasional aircraft taxiing and should maintain proper signage and marking to alert drivers to the presence of taxiing aircraft.

4.6 Taxi Channels

Taxi channels are water surfaces for taxiing seaplanes. They provide access from waterlanes to floatplane slips, lease lots and other on-shore facilities. The current SPB AC recommends a minimum taxi channel width of 125 feet with a preferred width of 150 feet. However, accounting for the uncertainty of shorelines, the AC recommends minimum clearances of 50 feet between taxi channel edges and the nearest object such as shoreline terrain or docks. A minimum of 50 foot wingtip-to-wingtip separation is also recommended for passing seaplanes.

The current FAA guidance, illustrated in Figure 4-2, shows a 225 to 250 feet minimum width for any taxi channels that support two passing aircraft. Two passing aircraft operations sometimes do occur in LHD taxi channels, but they are not frequent. Assuming only single aircraft taxiing by the Beaver design aircraft in the waterlane (not accounting for two passing aircraft operations) results in a taxi channel plus obstacle clearance width of 150 feet. This is based on the 48’ foot Beaver wingspan (rounded to 50’ feet) plus 50’ foot buffers from each wingtip.

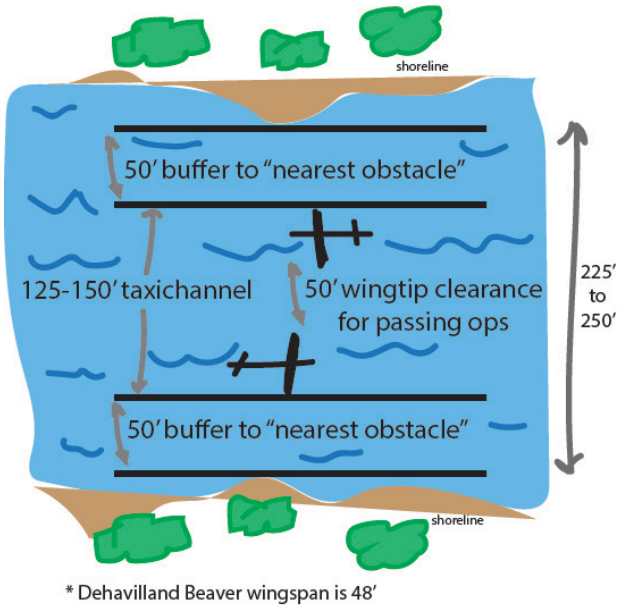

Figure 4-2: Taxi Channel Design for Passing Aircraft

Table 4-7 compares the FAA's recommended standards (with two passing aircraft) to the existing taxi channels. All of the main taxi channels meet the 150 foot taxi channel width, but they do not all meet the 225 to 250 foot width for two passing aircraft.

Table 4-7: Taxi Channel Requirements

Taxi Channel	Applicable FAA Standard	Existing Condition	Compliance Condition If Met (☒)
E- W (Slow) Taxi Channel			
Channel Width	Min 125'/Rec 150'	> 150'	☒
Channel Width with Passing Aircraft and 50' Edge Clearance	Min 225'/Rec 250'	Min 175'/Max 225'	Variable
Commercial Finger			
Channel Width	Min 125'/Rec 150'	> 150'	☒
Channel Width with Passing Aircraft and 50' Edge Clearance	Min 225'/Rec 250'	Min 165'/Max 233'	Variable
Finger Two			
Channel Width	Min 125'/Rec 150'	> 150'	☒
Channel Width with Passing Aircraft and 50' Edge Clearance	Min 225'/Rec 250'	185'	No
Finger Three			
Channel Width	Min 125'/Rec 150'	> 150'	☒
Channel Width with Passing Aircraft and 50' Edge Clearance	Min 225'/Rec 250'	Min 165'/Max 190'	No
Finger Four			
Channel Width	Min 125'/Rec 150'	> 150'	☒
Channel Width with Passing Aircraft and 50' Edge Clearance	Min 225'/Rec 250'	185'	No
Finger Five			
Channel Width	Min 125'/Rec 150'	> 150'	☒
Channel Width with Passing Aircraft and 50' Edge Clearance	Min 225'/Rec 250'	185'	No
East Lake Spenard			
Channel Width	Min 125'/Rec 150'	< 50'	No
* Variable indicates multiple instances where minimum standard is not met by varying degrees.			

Sources: FAA AC150-5395-1A, 2006 Lake Hood Master Plan, Google Earth measurements, RS&H and DOWL Analysis

4.6.1 East-West Taxi Channel

The East-West Taxi Channel at LHD is the core pathway for floatplanes traveling between Lakes Hood and Spenard and to/from waterlanes and on-shore facilities. The majority of the taxi channel exceeds the 150 feet recommended width, and accounts for the additional 50 foot clearances on each side of the channel. The exception to this is the more restrictive "pinch point" at the east end, which, at 175 feet wide, does not provide 50 foot edge clearances for passing aircraft. Movement through this channel is primarily west to east and aircraft passing

operations are a non-routine occurrence. However, the current width is wide enough for a single 48 foot wide Beaver wingspan plus 50 foot wingtip clearances to the shoreline, which is the more routine occurrence. Pilots, the airport and the tower have not reported incidents due to the inability of two passing aircraft to taxi through this area at the same time. Widening the 175 foot wide pinch point should be considered if future relocation of Lakeshore Drive and/or slip reconfiguration and erosion control are considered in the future in this areas. Signage and/or pilot notifications addressing the constriction could also help avoid potential issues.

4.6.2 Commercial Finger Taxi Channel

The Commercial Finger Taxi Channel between the Commercial Finger and Finger 2 is approximately 250 feet wide. This is enough clearance for passing aircraft and meets FAA recommendations. However, the point at which the taxi channel intersects the Slow Taxi Channel appears restricted to approximately 160’ when docks are in the water. This pinch point does not allow room for the simultaneous entering/exiting of seaplanes. Simultaneous passing aircraft is rare in this area and pilots, the airport and the tower have not reported any issues. Widening this space does not appear practical given the presence of relatively new hangars at the end of the Commercial Finger. Signage and/or pilot notifications addressing the constriction could help avoid potential issues.

4.6.3 Fingers 2-5 Taxi Channels

Fingers 2-5 taxi channels at LHD range from 160 feet to 190 feet wide. This exceeds the minimum taxi channel width requirements but does not adequately allow clearance for small passing floatplanes while meeting the FAA clearance recommendations. Simultaneous passing aircraft are rare in this area, and pilots, the airport, and the tower have not reported any issues. Widening this space does not appear practical given the narrow widths of the fingers. Signage and/or pilot notifications addressing the constriction could help avoid potential issues.

4.6.4 East Lake Spenard Taxi Channels

Two very narrow, roughly 50 – 70 foot, taxi channels provide access to slips 901 – 920 in East Lake Spenard. These taxi channels are wide enough to accommodate the wingspan of a Beaver,

but with very minimal additional wingtip clearance to the shore. Fortunately many of the slips are long, allowing the parked floatplanes to be set back from the taxi channel. The master plan should consider a redevelopment of this area to widen the taxi channel, preferably without reducing the number of slips.

4.6.5 Floatplane Pull Out Ramps

LHD has two public ramps to launch and remove floatplanes from the water. The first, known as the "North Ramp," is located at the north end of Lake Hood near the Delta parking area. The second, named the "West Ramp," is on the west side of Lake Hood near the east end of Taxilane V. In addition many float slip permit holders have their own ramps on their slips and several leaseholds have ramps or docks for floatplanes. A private ramp located at the south end of Lake Hood is owned by the Alaska Department of the Interior Aviation Maintenance Division (DOI AMD). This ramp can be used, with permission, by larger aircraft when there are strong crosswind conditions or when the lake water elevation is low.

The North Ramp has experienced wave erosion that has caused a loss of material and drop offs around the outer edges of the concrete. This presents a risk to pilots launching larger aircraft. The edges sometimes protrude above the water and there has been some damage to aircraft floats. The concrete surface is uneven. The west ramp was designed in a similar manner and has also experienced wave action erosion resulting in holes and difficult launch conditions. Both the North and West Ramps are currently closed to amphibious aircraft because existing conditions could result in damage to aircraft gear upon exiting. Addressing these issues could reopen the facilities to amphibious aircraft.

The North and West Ramps should be repaired or replaced. The West Ramp repairs are scheduled for construction in 2017. The airport should consider defined areas at each ramp for parking and anchoring of floatplanes that are waiting to load and unload as well as for parking and maneuvering vehicles and trailers.

A new ramp was proposed in the 2006 Master Plan at the south end of Lake Hood for use by floatplanes in certain wind conditions, to add capacity when the ramps are busy, and

potentially to accommodate larger amphibious aircraft. Ramp sizes, shapes and amenities vary and LHD floatplane pilots should be consulted in the redesign of existing ramps or the creation of any new ramps. The Airport should continue to evaluate the future need for a new ramp at the south end of Lake Hood; noting that two slips would likely be eliminated.

4.7 Approaches, Navaids, Weather, Lighting, Marking, Signage

4.7.1 Instrument Approaches, Navaids, and Weather

Most aircraft operating from LHD fly in VFR conditions, allowing them to land at LHD. There are currently no instrument approach procedures for LHD. Pilots wishing to access LHD under IMC may do so under an IFR into ANC. With the close proximity of ANC and complex airspace in Anchorage, it would be very unlikely that a standalone IFR approach procedure for LHD would ever be approved.

A PAPI should be installed adjacent to the gravel runway in support of VFR operations on Runway 14-32. This would help pilots avoid surrounding obstructions and determine the correct flight path into the gravel runway.

LHD is served by nearby automated weather reporting stations and two windsocks, which assessed to meet LHD's needs over the planning period.

4.7.2 Airside Lighting

The existing MIRL lighting system at the LHD gravel strip was replaced in 2012 and the lighting lining the south bank of Gull Island and the south shore of the E-W Waterlane channel was installed 10 to 15 years ago. They are both currently in good working condition, but their condition should be monitored over the next 20 years, and they should be repaired or replaced as needed.

4.7.3 Marking and Signage

There are numerous types of airside and landside facility signage and markings at LHD to address the unique mix of aircraft, vehicles and pedestrian on road and taxiway surfaces. Signage and marking is not consistent throughout LHD, and some areas with the greatest

potential for conflict should be upgraded and made more consistent. Pilots and the FAA have also commented that improvements are needed to signage and marking. LHD reviews and updates signage and markings on an ongoing basis. LHD should continue to update its signage and marking to address problem areas as well as improve consistency.

4.8 Aircraft Parking and Storage

Current aircraft parking and storage demand exceeds current capacity at LHD for floatplanes and for aircraft parking on lease lots. The availability of water, snow, gravel and paved operating surfaces makes LHD a particularly attractive place to fly general aviation aircraft. This rare and highly flexible mix of operating surfaces and aircraft gear configurations cannot be found elsewhere in Anchorage.

4.8.1 Existing Based Aircraft

Table 4-8 below shows based and transient aircraft counts from the 2006 Master Plan and counts from 2015. Since all of the airport-managed slips and tie downs are occupied, the based aircraft on airport-managed parking are assumed to be the same as the number of slips and tie downs. The lessee-managed aircraft parking came from lessee interviews, reviews of aerial photos, and a visual survey of lease areas. In the case of lessees, there are vacant float and wheeled parking spots that are not counted as based aircraft.

In summary, airport-managed floatplane slips increased by 3 slips since 2006 and airport-managed wheeled plane parking increased by 94 tie downs, primarily due to the expansion of Echo Parking recommended in the 2006 Master Plan. There is no firm data available to show the number of floatplanes parked on wheeled tie down spots, and some aircraft convert from wheels to floats during the year, so these aircraft are simply shown as based wheeled aircraft for the purposes of this based aircraft data, as they occupy a tie down spot.

Lessee-managed based aircraft parking is estimated to have increased by 9 spots from 2006 to 2015. The total number of airport and lessee based aircraft parking increased by 106 aircraft during this period.

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Table 4-8: 2006 and 2015 Based and Transient Aircraft Parking

Based and Transient Aircraft – Airport-Managed Parking, 2006 MP	Total
Based Float Slips	**341**
Transient Float Slips	**8**
Subtotal Based and Transient Slips	**349**
Tiedowns	
Alpha	77
Bravo	55
Charlie	30
Delta	10
Echo	90
LHD Strip plus Annex	106
Total Airport-Managed Based Tie Downs	**368**
Transient (Alpha)	**15**
Subtotal Based and Transient Tie Downs	**383**
Total Based Aircraft – Airport-Managed Parking (excludes transient parking)	**709**
Based Aircraft – Lessee-Managed Parking 2006 MP	
Float Slips	80
Apron	155
Hangar	105
Total Based Aircraft – Lessee-Managed Parking	**340**
Total Based Aircraft – Airport and Lessee (excluding transient)	**1049**
Total with transient	**1072**

Based and Transient Aircraft – Airport-Managed Parking, – 2015	Total
Based Float Slips	**344**
Transient Float Slips	**8**
Subtotal Based and Transient Slips	**352**
Tiedowns	
Alpha	83
Bravo (35 push back, 20 pull through)	55
Charlie	38
Delta	10
Echo	159
LHD Strip (89) Plus Annex (8)	97
West Ramp	11
Wheeled Aircraft on Slips (in addition to floatplane)	8
Total Airport-Managed Based Tie Downs	**462**
Transient	**24**
Subtotal Based and Transient Tie Downs	**486**
Total Based Aircraft – Airport-Managed Parking (excludes transient parking)	**806**
Based Aircraft – Lessee-Managed Parking, 2016	
Float Slips	61
Tiedowns	179
Hangar	109
Total Based Aircraft – Lessee-Managed Parking	**349**
Total Based Aircraft – Airport and Lessee (excluding transient)	**1155**
Total with transient	**1187**

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In summary, for 2015, LHD has the following wheeled and float equipped aircraft on parking areas provided by the airport and its leaseholders.

Table 4-9: Lake Hood Based Aircraft Parking Summary

Based Aircraft – Lake Hood – 2015	Total
Based Floatplanes	**405**
Based Wheeled Aircraft (includes drydocked parked floatplanes and wheeled planes on slips)	**750**
Total Based Aircraft Parking	**1155**

4.8.2 Future Aircraft Parking Demand

4.8.2.1 Airport-Managed Floatplane Parking Demand

Floatplane parking and lease lot/hangar availability was documented in the master plan survey as being one of the most frequently expressed needs at LHD. Current floatplane parking demand is demonstrated by the full issue of all airport-managed float slip permits and by the 274 person floatplane slip waitlist at the end of 2015. There are few alternatives to LHD. A limited number of floatplane parking areas can be found in several lakes in the Anchorage Bowl and the Mat-Su, mostly at private residences. As noted above, one unique feature offered at LHD that is not available at any other public airport in the region is the ability of operators to switch aircraft from floats to skis or wheels during the year.

The table below documents the status of the LHD floatplane waitlist during the 2006 Master Plan and today. During the 2006 Master Plan the waitlist was 220 people and the person at the top of the list had been on the list for 5.5 years. Approximately 40 people were offered slips in that year and about 75%, or 30 people, accepted a slip. By comparison, in 2016 the waitlist has 274 people, the person at the top of the list has been on the list for 11 years, approximately 27 slips were offered to waitlist members over the past year, and approximately 18 people, or 65% of those offered, accepted a slip.

Table 4-10: Floatplane Waitlist in 2006 and 2016

	2006 Master Plan	2016
People on Floatslip Waitlist	220	274
Timeframe to Get Slip	5.5 years	11 years
People Offered Slip/Year	40	27
%/Number That Accept Slip/Year	75%/30	65%/18

The waitlist is a good indicator of current/near term floatplane demand. Since 2006 the number of floatplane slips has remained mostly unchanged while the size of the waitlist has increased by 54, possibly suggesting a slight uptick in demand. However, it should be noted that the waitlist was particularly small in 2006 because the airport had just completed regulation revisions and enforcement actions that caused a large one-time turnover of slips. The airport also started to charge an annual fee to be on the waitlist, discouraging some less serious pilots from joining the list.

As shown above, about 65% of waitlist members accept a slip when it is offered. This acceptance rate is similar to the 75% rate noted in 2006, and is expected to continue into the immediate future. The 2025 requirement for new airport-managed floatplane slips is estimated to be 65% of the current 274 waitlist members, or about 175 slips. The requirement for slips after 2025 is estimated to grow at 0.7% per year, which is slightly lower than the forecasted 1.4% growth in aircraft operations. Average hours flown per pilot is trending upward, suggesting operations will grow slightly faster than based aircraft. Transient floatplane demand is expected to grow at a constant 1.4% per year, at the rate of growth of LHD aircraft operations. Future floatplane parking and storage requirements are shown in Table 4-11.

A factor in consideration of demand for aircraft parking is the aging of pilots, as was discussed in Chapter 3, and is reported by the FAA and by the Aircraft Owner and Pilot's Association. Based on a random sample of 7% of private pilots with LHD permits, over 40% of current LHD permittees are over 65 years old, 40% are between 55 and 65 years old, and 20% are less than 55 years old. While the sample size is small, these numbers support the notion that LHD pilots are older, and perhaps the waitlist turnover rate will increase and the size of the waitlist will decrease over the long term. The aging of pilots may also help partly explain why only 65% of

waitlist people accept a slip when offered one. By the time they reach the top of the waitlist and are offered a slip, some pilots may find they are no longer interested in flying floatplanes from LHD because of their age. Fewer young people are becoming pilots as discussed in Chapter 3. Anchorage pilots declined from a high of 4,101 in 2004 to 3,714 in 2014; a pilot reduction trend that is also seen at the statewide and national levels.

4.8.2.2 Airport-Managed Wheeled Plane Parking Demand

Airport-managed wheeled tie downs are currently fully occupied. Echo Parking, which has electric power supplied at the tie downs, has a waitlist of 46. Alpha and Bravo Parking now have electric power supplied at the tie downs during 2015 construction. On the other hand, when the airport expanded Echo Parking, the new tie downs were quickly occupied, suggesting some growth in demand during that timeframe. Merrill Field also offers wheeled tie downs and has excess capacity.

Some wheeled tie downs are used by dry docked floatplanes (floatplanes parked on a tie down on land) or by aircraft that switch from floats to wheels during the year. If slip availability were not an issue it is assumed that some dry docked floatplanes would relocate to a slip and LHD might have excess paved/gravel parking. An informal count in late April, 2015 showed 32 dry dock floatplanes and 47 floats stored on a tie down, for a total of 79 dry docked floatplanes and stored floats.

LHD wheeled plane demand is expected to grow at 0.7% per year, half the rate of the forecasted growth in aircraft operations, reflecting the age and reductions in numbers of pilots and increase in average hours flown per pilot. Transient wheeled aircraft demand is expected to grow at a constant 1.4% per year, the same as the growth of LHD aircraft operations.

4.8.2.3 Lease Lot and Hangar Demand

LHD is the only public commercial floatplane base in the Anchorage area. As noted in the forecasts, air taxi businesses are busy, demand from a growing visitor industry is strong, and overall LHD air taxi operations are projected to grow by 1.4% per year. According the LHD Master Plan survey, 57% of respondents expressed interest in developing land for hangars.

The hangar parking was rated second to floatlane parking as the most important type of aircraft parking needed. More hangar space was among the top 3 listed airport needs. LHD staff indicated receiving a leaseholder inquiry every other month or so, or about 6 inquiries per year. Similar to floatplane slips, there is unmet demand for lease lots, but there is no formal lease lot "waitlist". Inquiries are probably limited by the general knowledge that there is limited space at LHD and development costs are high. Leaseholder aircraft parking and storage is forecasted to grow at 1.4%, at same rate as forecasted air taxi operations.

Table 4-11: Aircraft Parking and Storage Requirements

Aircraft Parking Area	2015 (Current)	2020 Demand	2025 Demand	2035 Demand	Average Annual Growth Rate
Airport-Managed Parking					
Float Slips					
Based Float Slips	344	432	519	557	0.7%/year after 2025
Transient Float Slips	8	9	9	11	1.4%/year
Subtotal Based and Transient Slips	**352**	**441**	**528**	**568**	
Tiedowns					
Total Based Tie Downs	462	478	495	531	0.7%/year
Transient Tie Downs	24	26	28	32	1.4%/year
Subtotal Based and Transient Tie Downs	**486**	**504**	**523**	**563**	
Total Airport-Managed Parking	**838**	**945**	**1,051**	**1,131**	
Lessee-Managed Parking					
Float Slips	61	65	70	81	1.4%/year
Tiedowns	179	192	206	236	1.4%/year
Hangar	109	117	125	144	1.4%/year
Total Lessee-Managed Parking	**349**	**374**	**401**	**461**	
Total Airport and Lessee Parking	**1,187**	**1,319**	**1,452**	**1,592**	
Annual Average Growth Rate		**2.13%**	**1.94%**	**0.92%**	**1.48%**

The annual average growth rate of LHD aircraft parking is estimated to be 1.48% over the 20 years planning horizon. This is slightly higher than the 1.4% growth in total operations over the same period because of the current unmet demand for floatplane parking. After the near term floatplane demand is accounted for in 2025, the 0.92% growth in based aircraft from 2025 to 2035 is similar to the general aviation based aircraft growths forecasted in the 2006 LHD Master Plan (0.83%, but did not include waitlist), Merrill Field Master Plan (0.7%), FAI Master Plan (1.1%), and the Alaska Aviation System Plan forecast for ANC and LHD (1%).

4.9 Surface Condition

4.9.1 Runways, Taxiways, Aprons

Runway 14-32 is gravel surfaced. Some pilots report that it is soft in the spring and has rocks mixed within the gravel surface course. Gravel runways typically need a major resurfacing every 10 – 20 years. Annual surface maintenance is needed and the runway should receive a major resurfacing during the 20 year planning horizon of the master plan.

Taxiway H is paved on the north end and gravel on the south end. Users have expressed interest in paving the entire length. Taxiway H should be resurfaced with pavement or gravel during the 20 year planning horizon of the master plan. It should be straightened when it is resurfaced.

Taxilane V and the north and west ends of the Lakeshore Taxilane are experiencing pavement distress and should be resurfaced or reconstructed. These portions of Lakeshore Taxilane are scheduled for reconstruction in 2017. Other taxiway segments may need to be resurfaced sometime during the 20 year planning horizon.

4.9.2 Roads

Road access to LHD from International Airport Road, West Northern Lights Boulevard via Postmark Drive and Hood Drive, and Spenard Road via Wisconsin is good. Many of the internal roads have been resurfaced over the last 15 years and most are in good to fair condition. Over the 20 year planning horizon segments of the internal roads may need to be resurfaced.

Internal road access to tiedowns, float slips, leaseholds and other LHD facilities is paved, except for the gravel roads accessing floatplane slips along the five fingers and at the northeast corner of Lake Spenard. Paving these areas would reduce dust, improve drainage, and would help to define the boundary between the road and the slips. However, traffic on these roads is light and may not justify the expense of paving. Paving these gravel roads was supported by some pilots in the master plan survey.

4.10 Pedestrians

LHD is popular with pedestrians. Pedestrians and bikers using LHD enjoy travelling around the lakes, transiting through LHD enroute to other destinations, and many enjoy watching the aviation activity. As discussed earlier, pedestrian access can be challenging and sometimes present risks due to close proximity of pedestrians to taxiing aircraft and vehicles, poor line of sight in some areas, and sometimes due to a lack of familiarity of where to go. The airport should continue efforts to develop a trail system at LHD better segregated from aircraft and automobile traffic and the pedestrian routes should be easier to find and follow.

4.11 Vehicle Parking

Lessees and permittees are required to provide for their own parking at their leases, tiedowns and float slips. Some lease lots, such as on the Commercial Finger, do not have very much vacant space for automobile parking. The existing free public vehicle parking areas at the Runway 14-32 tiedown area, on the Commercial Finger, and near the Aviation Heritage Museum may remain if they do not interfere with other master plan needs.

4.12 Utilities

Existing lease lots have access to utilities. New lease lot development could be encouraged by extending utility access.

4.13 Security and Fencing

Improving security and safety at lease lots, tie down areas, roads, taxiways and on the runway and waterlanes is a priority of LHD users as expressed in project surveys and in public input. Solutions expressed were very diverse, ranging from improved security cameras and staff

patrols to additional flashing lights, marking, signage and fencing. The 2006 Master Plan determined that LHD should not be enclosed by a fence that would prevent public access and that most areas on LHD should remain open for public enjoyment. This plan continues that philosophy but recommends that efforts should continue to improve safety and security through education, enforcement, cameras, lighting, signage, limited gates and fences, and other means. The FAA Runway Safety Action Team also recommended increased efforts in these areas, particularly in areas where aircraft operate.

4.14 Airport Management and Administration

LHD management and administrative staff currently operate from subleased property on the west shore of Lake Hood. While the location and view allows airport staff to monitor LHD operations, it requires staff and users to cross an active taxilane, is not ADA compliant, and the airport must pay a monthly sublease fee to the lessee. The master plan should consider if another airport office location would better serve the needs of airport users and staff.

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5.0 ALTERNATIVES

This chapter identifies and evaluates LHD development alternatives. The alternatives were guided by master plan goals and objectives defined in Chapter 1 and they address facility requirements identified in Chapter 4. The alternatives were also guided by the issues, needs and ideas presented by stakeholders in the master plan survey and public meetings, and by the Advisory Committee. Stakeholder views varied from those who wanted major expansion to those who mostly just wanted to maintain existing facilities. The master plan evaluated the alternatives using the Advisory Committee, other stakeholder meetings, the FAA, and airport staff through various methods; including, an electronic survey, individual meetings and email communications, and a public open house. The Draft Development Plan, made up of projects from each of the alternatives was similarly reviewed by these groups. The alternatives, evaluation process, and Draft and Final Development Plan are further described below.

5.1 Alternatives Overview

Alternatives A – D were developed to show a range of intensity and cost of development with A having the least development and cost and D having the most. The alternatives are named below and shown in Figures 5-1 to 5-5. Projects addressing the issues, needs and facility requirements were included in the each of the alternatives, based on which alternative best matched the type of project. The alternatives included:

- **Alternative A: No Capital Improvements** – Minor maintenance and management of existing facilities without use of capital projects.
- **Alternative B: Major Maintenance & FAA Standards** – Major maintenance requiring CIP projects and resolving FAA standards deficiencies.
- **Alternative C: Improve Existing Facilities** – Upgrade existing substandard facilities.
- **Alternative D: Expand Facilities** - Expand facilities to meet existing and future demand.

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FIGURE 5-1 ALTERNATIVE A

NO CAPITAL IMPROVEMENTS

A1 MAINTAIN EXISTING FACILITIES (AREA WIDE, NOT LABELED ON DRAWING)

A2 IDENTIFY AND MITIGATE AIRCRAFT & STRUCTURES FROM AIRCRAFT TAXI ROUTES

A3 AIRCRAFT, AUTO, PEDESTRIAN ENFORCEMENT, EDUCATION, SIGNS, FLASHING LIGHTS & MARKINGS (AREA WIDE, LOCATION TO BE DETERMINED)

NOTE: RECOMMENDED ALTERNATIVE IS LIKELY TO CONTAIN FEATURES FROM ALL OF THE ALTERNATIVES.

A2 A2 A2 A2 A2 A2 A2 A2

LAKE HOOD ALASKA

LAKE HOOD SEAPLANE BASE
MASTER PLAN UPDATE

LEGEND

- RUNWAY/WATERLANE
- TAXIWAYS/RAMPS
- ROAD
- PEDESTRIAN PATHWAY/VIEWING
- LEASE LOTS/TIE DOWN AREA
- SLIPS/DRY DOCK
- EROSION CONTROL/DREDGING

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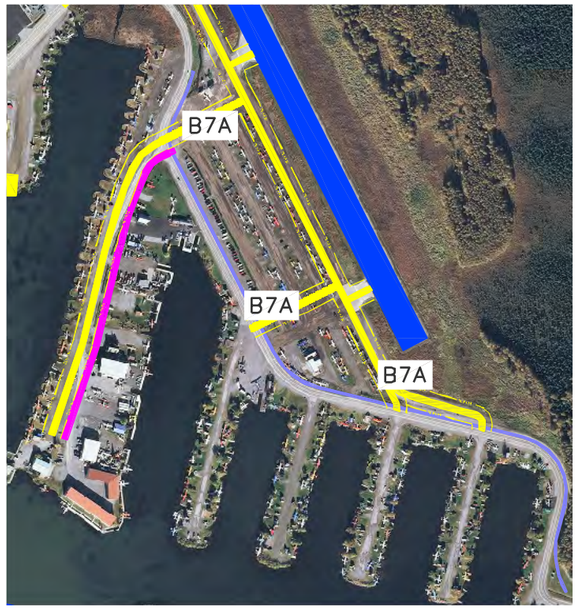
FIGURE 5-2 ALTERNATIVE B

MAJOR MAINTENANCE & FAA STANDARDS

B1	REHAB RUNWAY SURFACE, IMPROVE DRAINAGE, & REPLACE LIGHTING
B2	WIDEN E-W WATERLANE; LOWER & RESURFACE GULL ISLAND
B3	SELECTIVE DEEPENING OF WATERLANES/TAXI CHANNEL/FINGERS
B4	ADDRESS RUNWAY VISIBILITY ZONE CONFLICTS THROUGH MODIFICATION OF STANDARDS
B5	ADDRESS RUNWAY PROTECTION ZONE CONFLICTS WITH LEASE LOT MANAGEMENT
B6	REALIGN TAXIWAYS H & H3
B7	CONSTRUCT PARALLEL LAKESHORE TAXILANE, ROAD & PEDESTRIAN PATH WITH CONNECTORS
B7A	CONSTRUCT CONNECTOR TAXILANES & PEDESTRIAN PATH
B8	CONSTRUCT PARALLEL ROAD & TAXILANE ON COMMERCIAL FINGER
B9	RESURFACE/RECONSTRUCT PORTIONS OF LAKESHORE TAXIWAY
B10	RESURFACE/RECONSTRUCT TAXILANE V (ANC PROJECT)
B11	REPAIR/REPLACE EXISTING FLOATPLANE RAMPS
B12	CONTINUE EROSION CONTROL/SLIP DREDGING PROJECTS

NOTE: RECOMMENDED ALTERNATIVE IS LIKELY TO CONTAIN FEATURES FROM ALL OF THE ALTERNATIVES.



B-7A ALTERNATIVE

B-7 DETAIL

B-8 DETAIL

LAKE HOOD SEAPLANE BASE
MASTER PLAN UPDATE

LEGEND

- RUNWAY/WATERLANE
- TAXIWAYS/RAMPS
- ROAD
- PEDESTRIAN PATHWAY/VIEWING
- LEASE LOTS/TIE DOWN AREA
- SLIPS/DRY DOCK
- EROSION CONTROL/DREDGING

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FIGURE 5-3 ALTERNATIVE C

IMPROVE EXISTING FACILITIES

C1	ENHANCE VIEWING AREAS AT SPENARD BEACH & NEXT TO DOT&PF BUILDING
C2	PAVE PARALLEL TAXIWAY FOR RUNWAY 14/32 & FINGERS
C3	EXPAND CONCRETE RUN-UP AREAS
C4	PAVE, DRAINAGE IMPROVEMENTS, LIGHTING & ELECTRICAL SERVICE FOR RUNWAY 14/32 TIE DOWNS
C5	PAVE & DRAINAGE AT DELTA TIE DOWNS
C6	LIGHTING, ELECTRIC SERVICE & FENCING AT TRANSIENT SLIPS
C7	PAINT COMPASS ROSE (LOCATION TO BE DETERMINED)
C8	FENCING, CAMERAS, & LIGHTING SECURITY/SAFETY UPGRADES (AREA WIDE, LOCATION TO BE DETERMINED)

NOTE: RECOMMENDED ALTERNATIVE IS LIKELY TO CONTAIN FEATURES FROM ALL OF THE ALTERNATIVES.

C2 C5 C4 C2 C3 C2 C2 C2 C2 C2 C1 C6 C1 C6

LAKE HOOD SEAPLANE BASE
MASTER PLAN UPDATE

LEGEND

- RUNWAY/WATERLANE
- TAXIWAYS/RAMPS
- ROAD
- PEDESTRIAN PATHWAY/VIEWING
- LEASE LOTS/TIE DOWN AREA
- SLIPS/DRY DOCK
- EROSION CONTROL/DREDGING

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FIGURE 5-4 ALTERNATIVE D

EXPAND FACILITIES

D1	FENCING & GATES FOR RUNWAY 14/32 (LOCATION TO BE DETERMINED)
D2	REPLACE PEDESTRIAN PATH ON WEST SIDE OF RUNWAY 14/32 WITH NEW PATH ON EAST SIDE
D3	EXTEND TAXILANE TO MORE SLIPS ON LAKE SPENARD
D4	ADD FLOATPLANE RAMP
D5	EXPAND SLIP/LEASE AREA WEST OF HOOD STRIP, RELOCATE TIE DOWNS TO EAST OF HOOD STRIP WITH LEASE AREA, PARALLEL TAXIWAY & ROAD
D5A	EXPAND SLIP/LEASE AREA WEST OF HOOD STRIP, RELOCATE TIE DOWNS TO EAST OF HOOD STRIP WITH LEASE AREA, PARALLEL TAXIWAY, & ROAD
D6	EXPAND FLOATPLANE PARKING/LEASE AREAS IN LAKE SPENARD (VARIOUS EXAMPLES SHOWN ON SEPARATE DRAWING)
D7	TRANSIENT HELIPAD AT LAKE HOOD (LOCATION TO BE DETERMINED)
D8	NEW LEASE LOT/TIE DOWN SPACE WEST OF ECHO PARKING
D9	PERMANENT PUMPED TOILETS (LOCATION TO BE DETERMINED)
D10	CONTINUE LAND ACQUISITION
D11	EXPLORE WAYS TO MAKE LEASE LOT DEVELOPMENT AFFORDABLE (LOCATION TO BE DETERMINED)
D12	BOATHOUSE EXPANSION (LOCATION TO BE DETERMINED)

NOTE: RECOMMENDED ALTERNATIVE IS LIKELY TO CONTAIN FEATURES FROM ALL OF THE ALTERNATIVES.

D2
D8
D5
D5A
D4
D3
D6
D10
SEE D6 FLOATPLANE/LEASE EXPANSION EXAMPLES

D-5A ALTERNATIVE

LAKE HOOD SEAPLANE BASE
MASTER PLAN UPDATE

LEGEND

- RUNWAY/WATERLANE
- TAXIWAYS/RAMPS
- ROAD
- PEDESTRIAN PATHWAY/VIEWING
- LEASE LOTS/TIE DOWN AREA
- SLIPS/DRY DOCK
- EROSION CONTROL/DREDGING

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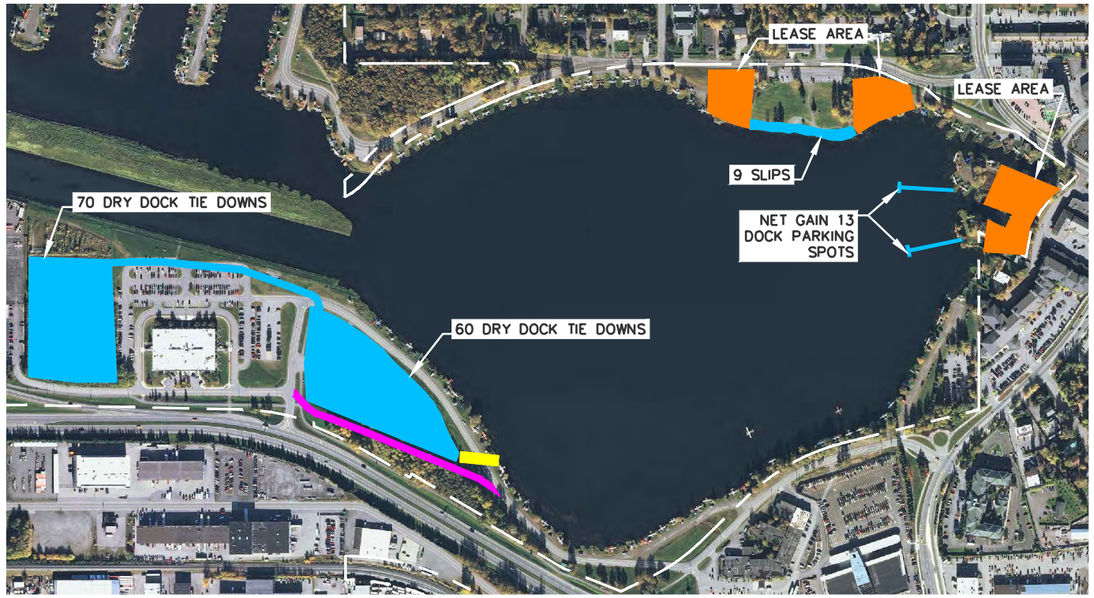
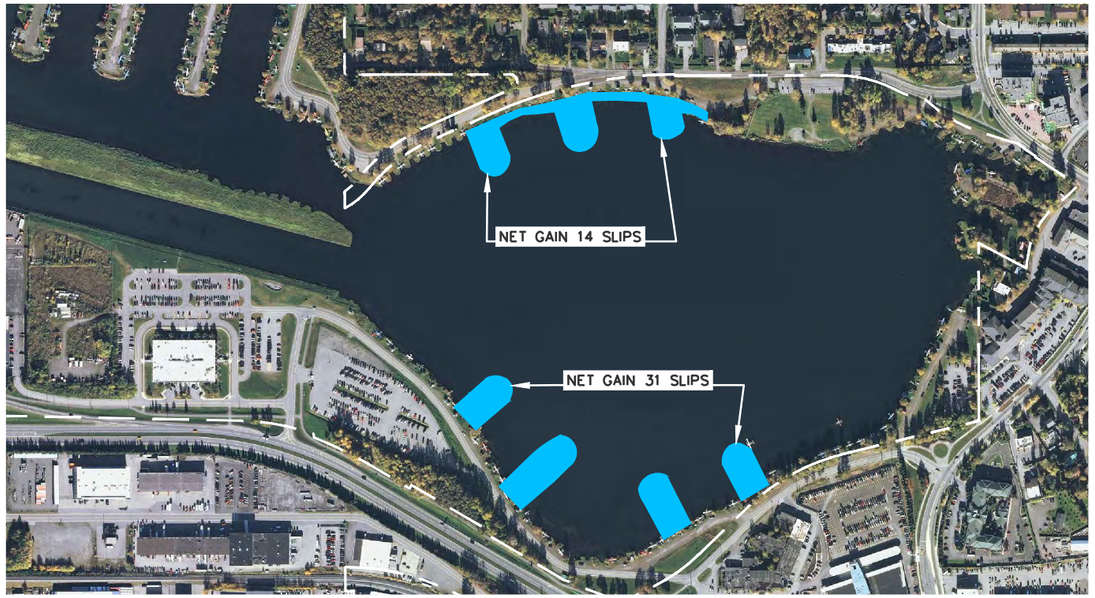
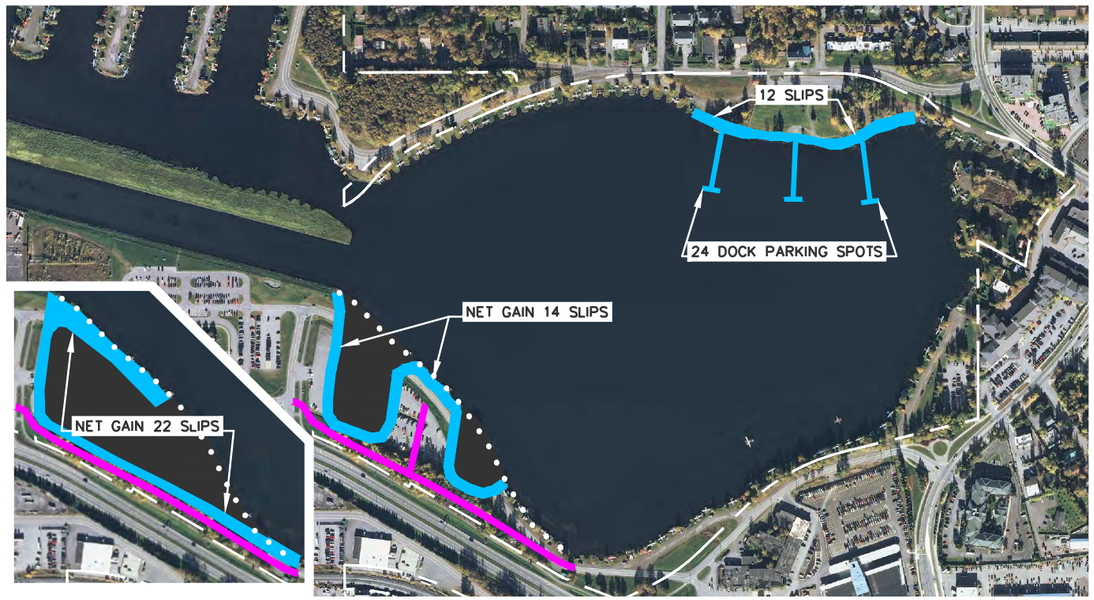


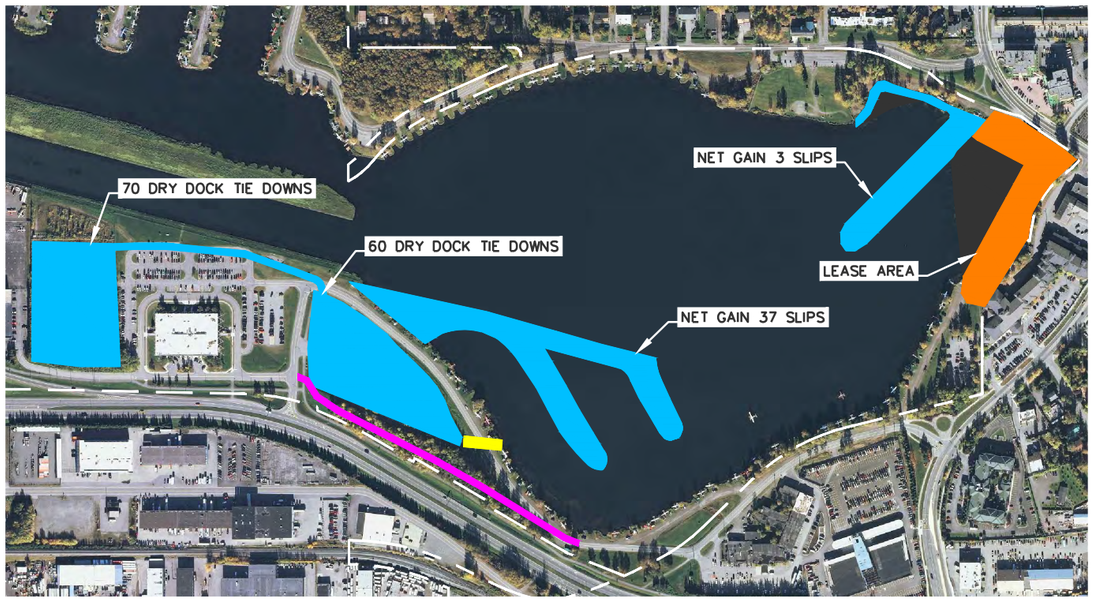
D6 A



D6 B



D6 C



D6 D

LAKE HOOD SEAPLANE BASE
MASTER PLAN UPDATE

LEGEND

- RUNWAY/WATERLANE
- TAXIWAYS/RAMPS
- ROAD
- PEDESTRIAN PATHWAY/VIEWING
- LEASE LOTS/TIE DOWN AREA
- SLIPS/DRY DOCK
- EROSION CONTROL/DREDGING

FIGURE 5-5
D6 FLOATPLANE PARKING/LEASE AREAS EXPANSION EXAMPLES

300 0 300 600
SCALE IN FEET

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5.2 Alternative A: No Capital Improvements

Alternative A, shown in Table 5-1 and Figure 5-1, continues management and minor maintenance of existing facilities with existing staff and operating funds, but without additional capital projects. Some stakeholder comments were from users who were either happy with LHD as it is or who did not want to see any significant changes because they thought LHD capital expenditures would trigger user fee increases. Some of the survey and meeting comments suggested the airport could accomplish many improvements at LHD without major capital expenditures. Some of these ideas were represented by Alternative A. Besides general maintenance, this alternative also proposes airport management actions to encourage safety through improved separation of aircraft, automobiles and pedestrians.

Table 5-1: Alternative A

Alternative A - No Capital Improvements		**Description**
A1	Maintain existing facilities (area wide)	Maintain existing airport with staff resources and operating budget.
A2	Identify and mitigate aircraft & structures from aircraft taxi routes	Widen the space for taxiing aircraft on roads by working with users to relocate parked aircraft and buildings, where possible.
A3	Aircraft, auto, pedestrian enforcement, education, signs, flashing lights & markings (area wide)	Reduce conflicts between aircraft, autos and pedestrians through signage, marking, flashing lights, and education/enforcement.

5.3 Alternative B: Major Maintenance & FAA Standards

Alternative B, shown in Table 5-2 and Figure 5-2, addresses maintenance needs that cannot be accomplished within airport staff or operating budget limits and projects addressing FAA standards deficiencies. These larger maintenance projects are better handled under the capital budget which typically involves more detailed design and construction by contractors instead of airport staff.

Table 5-2: Alternative B

Alternative B - Major Maintenance & FAA Standards		*Description*
B1	Rehabilitate Runway 14-32 gravel surface, improve drainage, & replace lighting	Rehabilitate the gravel runway surface, improve runway drainage, and replace lighting system.
B2	Widen E-W Waterlane; lower & resurface Gull Island	Widen waterlane from 188 feet to 200 feet to meet SPB Advisory Circular standard. Consider lowering and resurfacing island to reduce wildlife hazards.
B3	Selective deepening of waterlanes/taxi channel/fingers	Deepen shallow areas of Lakes Hood and Spenard.
B4	Address runway visibility zone conflicts through modification of standards	Propose modification of standards for runway visibility zone conflicts to FAA, as recommended in prior master plan.
B5	Address runway protection zone conflicts with lease lot management	Ongoing monitoring of development within runway protection zones to make sure incompatible development does not increase. It is not practical to remove existing development.
B6	Realign Taxiways H & H3	Straighten and resurface Taxiway H, relocate affected tie downs. Reconfigure angled Taxiway H3 to be 90 degrees to Taxiway H.
B7	Construct parallel Lakeshore Taxiway, road & pedestrian route with connectors	Construct a parallel road, taxiway and pedestrian route along Lakeshore Drive to reduce conflicts between aircraft, automobiles and pedestrians. Construct taxilane connectors to several fingers.
B7A	Construct connector taxilanes & pedestrian route	Construct taxilane connectors to several fingers and construct a pedestrian route along Lakeshore Drive to reduce conflicts between aircraft, automobiles and pedestrians.
B8	Construct parallel road & taxilane on Commercial Finger	Construct a parallel road and taxilane along the Commercial Finger to reduce conflicts between aircraft and automobiles.
B9	Resurface/reconstruct portions of Lakeshore Taxilane	Resurface or reconstruct several sections of Lakeshore Taxilane that have deteriorated pavement.
B10	Resurface/reconstruct Taxilane V	Resurface and reconstruct Taxilane V and replace its edge lights.
B11	Repair/replace existing floatplane ramps	Repair or replace the existing west and north floatplane ramps and address other facility needs for receiving, launching and tieing down aircraft during trailering.
B12	Continue erosion control/slip dredging projects	Complete erosion control and dredging improvements for slips experiencing the highest rate of erosion (approximately 100 slips).

5.4 Alternative C: Improve Existing Facilities

Alternative C, shown in Table 5-3 and Figure 5-3, proposes projects to upgrade existing LHD facilities by paving gravel surfaces, adding electrical service and lighting, fencing selective areas, improving visitor amenities, and adding other security and safety upgrades.

Table 5-3: Alternative C

Alternative C - Improve Existing Facilities		Description
C1	Enhance viewing areas at Spenard Beach & next to DOT&PF building	Improve public viewing areas at LHD to enhance the visitors' experience (informational displays about LHD history, businesses, economic impacts and additional visitor amenities).
C2	Pave parallel taxiway for runway 14/32 & fingers	Pave Taxiway H and pave and mark the road right of way for the finger roads to better define and widen the road for taxiing aircraft.
C3	Expand concrete run-up area	Widen the existing run-up area at Taxiway H4 so that aircraft can pass each other.
C4	Pave, drainage improvements, lighting & electrical service for Runway 14/32 tie downs	Pave, improve drainage, and install lighting and electrical plug-ins, similar to Alpha, Bravo, Charlie and Echo Parking Areas.
C5	Pave & drainage at Delta tie downs	Pave and improve drainage similar to Alpha, Bravo, Charlie and Echo Parking Areas.
C6	Lighting, electric service & fencing at transient slips	Add lighting, electrical plug-ins and fencing as needed at floatplane transient parking areas.
C7	Paint compass rose	Provide a painted compass rose on a paved area at LHD.
C8	Fencing, cameras & lighting security/safety upgrades (area wide)	Prepare and implement a plan of security and safety improvements, with input from users, FAA, and other interested parties/agencies. Examples may include signage, marking, flashing lights, lighting, cameras, and fencing etc. at selective locations.

5.5 Alternative D: Expand Facilities

Alternative D includes projects to expand LHD taxiways, roads, trails, floatplane ramps, aircraft parking, lease lots, helipad, fencing and gates, and other facilities. Several options were developed to expand floatplane slips in Lake Hood and Lake Spenard under projects D5 and D6.

Table 5-4: Alternative D

Alternative D - Expand Facilities		Description
D1	Fencing & gates for Runway 14/32	Add fencing and gates to reduce unauthorized vehicle and pedestrian access to Runway 14/32.
D2	Replace pedestrian route on west side of Runway 14/32 with new pedestrian route on east side	Construct a new pedestrian route east of Runway 14-32 to reduce pedestrian conflicts in the Lakeshore Drive area and to provide access to the Coastal Trail.
D3	Extend taxilane to more slips on Lake Spenard	Construct a new taxilane along Lakeshore Drive to provide wheeled aircraft access to Runway 14-32 from more slips.
D4	Add floatplane ramp	Construct a new floatplane haulout ramp at the south shore of Lake Hood to address wind issues and capacity at the existing ramps.
D5	Expand slip/lease area west of Runway 14-32, relocate tie downs to east of Runway 14-32 with lease area, parallel taxiway & road	Relocate Runway 14-32 gravel tie downs with parallel taxiway and road to the east side of the runway and provide lease area. Relocate Lakeshore Drive and build a new taxiway and trail west of the runway on top of the former tie downs. Dig new slips and provide lease areas on top of the location of the former tie downs and former Lakeshore Drive.
D5A	Expand slip/lease area west of Runway 14-32, relocate tie downs to east of Runway 14-32 with lease area, parallel taxiway & road	Same as D5 except without a new parallel taxiway.
D6A -D	Expand floatplane parking/lease areas in Lake Spenard	Expand floatplane parking and lease areas in Lake Spenard by building new slips, new floatplane docks, new dry dock parking, and/or redeveloping existing property in northeast Lake Spenard (4 options shown).
D7	Transient helipad at Lake Hood	Develop a new helipad at LHD for transient use. A specific location was not yet determined.
D8	New lease lot/tie down space west of Echo Parking	Develop a new lease lot and tie down area west of Echo parking, with access to Runway 14-32 via Taxiway E.
D9	Permanent pumped toilets	Replace porta potties with permanent pumped toilets.
D10	Continue land acquisition	Phased acquisition of remaining private residential parcels on the east shore of Lake Spenard as property becomes available on the market.
D11	Explore more ways to make lease lot development affordable	Identify ways to make lease lot development more affordable for new lessees.
D12	Boathouse expansion	Build another boat house on the east side of Lake Spenard to respond to aircraft emergencies.

5.6 Alternatives Evaluation

Airport stakeholders and the project team evaluated alternatives and projects using several methods. Initial project ratings by stakeholders were completed without consideration of funding limitations. Detailed results of these ratings can be found in Appendix C.

- Advisory Committee - Committee members rated projects within each alternative high, medium or low priority using colored dots.
- Other Stakeholder Meetings – The project team presented the alternatives at meetings of the Lake Hood Pilots Association and the Alaska Airmen Association.
- Alternatives Survey – 99 people completed an electronic survey that rated the priority of alternatives projects.
- Public Open House – 50 people attended an open house and rated the priority of alternatives projects.
- Email Comments – About a half dozen people submitted email comments.

5.7 Draft and Final Development Plan

Following these stakeholder meetings, the project team met with the FAA to discuss priority and funding. FAA's priorities centered around runway, taxiway, and apron projects and enhancing safety and security.

The team then met with airport staff to discuss the input from stakeholders and the FAA, reviewed costs and forecasted CIP funding, and prepared a Draft Development Plan. Projects were grouped into two groups - Capital Improvement Program Projects to be accomplished with FAA and airport capital funding and Other Recommended Projects that would be accomplished with combinations of airport operating funding, funding from outside the airport, or through airport management actions. Table 5-5, 5-6 and Figure 5-6 show the Draft Development Plan's Capital Improvement Program Projects and Other Projects.

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	CAPITAL IMPROVEMENT PROGRAM PROJECTS	ESTIMATED COST
1	RESURFACE/RECONSTRUCT PORTIONS OF LAKESHORE TAXILANE AND WEST LAKE HOOD FLOATPLANE RAMP	$4,510,000
2	RESURFACE/RECONSTRUCT TAXILANE V	$8,800,000
3	FENCING, CAMERAS & LIGHTING SECURITY/SAFETY UPGRADES (AREA WIDE - NOT ON DRAWING)	$2,000,000
4	CONTINUE EROSION CONTROL/SLIP DREDGING PROJECTS	$6,200,000
5	REPAIR/REPLACE EXISTING FLOATPLANE RAMP	$700,000
6	LAND ACQUISITION AND REDEVELOPMENT IN EAST LAKE SPENARD	$2,500,000
7	CONSTRUCT PARALLEL ROAD & TAXILANE ON COMMERCIAL FINGER	$1,100,000
8	REHAB GRAVEL RUNWAY SURFACE, IMPROVE DRAINAGE & REPLACE LIGHTING	$3,200,000
9	ADD FLOATPLANE RAMP IN LAKE HOOD	$500,000
10A	EAST RUNWAY 14/32 TIE DOWNS, TAXIWAY, ROAD & ELECTRICAL	$9,000,000
10B	LAKESHORE DRIVE & PATH RELOCATION AND TAXIWAY CONNECTORS	$1,700,000
10C	SLIP/LEASE LOT AREA DEVELOPMENT	$4,700,000
11	RECONSTRUCT AND REALIGN TAXIWAY H (PARALLEL TAXIWAY)	$1,500,000
12	REALIGN TAXIWAY H3	$200,000
13	FENCING & GATES FOR TAXIWAY ACCESS TO RUNWAY 14/32	$1,000,000

FIGURE 5-6 OTHER PROJECTS (OTHER FUNDING SOURCES OR MANAGEMENT ACTIONS)

A	MAINTAIN EXISTING FACILITIES (AREA WIDE - NOT SHOWN ON DRAWING)
B	IDENTIFY AND MITIGATE AIRCRAFT & STRUCTURE FROM INFRINGEMENT ON AIRCRAFT TAXI ROUTES
C	AIRCRAFT, AUTO, PEDESTRIAN SEPARATION, EDUCATION, SIGNAGE, FLASHING LIGHTS, MARKINGS & ENFORCEMENT (AREA WIDE - NOT SHOWN ON DRAWING)
D	SELECTIVE MAINTENANCE OF WATERLANES/TAXI CHANNELS/FINGERS (AREA WIDE - NOT SHOWN ON DRAWING)
E	ADDRESS RUNWAY VISIBILITY ZONE CONFLICTS THROUGH MODIFICATION OF STANDARDS (AREA WIDE - NOT SHOWN ON DRAWING)
F	ADDRESS RUNWAY PROTECTION ZONE CONFLICTS WITH LEASE LOT MANAGEMENT
G	ENHANCE VIEWING AREAS AT SPENARD BEACH & NEXT TO DOT&PF BUILDING
H	EXPAND RUN-UP AREA
I	LIGHTING, ELECTRIC SERVICE AND/OR FENCING AT TRANSIENT SLIPS
J	PEDESTRIAN PATH ON EAST SIDE OF RUNWAY 14/32
K	LONG TERM EXPANSION OF NEW LEASE LOT/TIE DOWN SPACE EAST AND WEST OF ECHO PARKING AND EAST OF RUNWAY 14/32
L	PERMANENT PUMPED TOILETS (NOT SHOWN ON DRAWING)

LAKE HOOD SEAPLANE BASE
MASTER PLAN UPDATE
RECOMMENDED DEVELOPMENT PLAN

LEGEND

- RUNWAY
- TAXIWAYS/RAMPS
- ROAD
- PEDESTRIAN PATH/VIEWING
- LEASE LOTS/TIE DOWN AREA
- SLIPS/LEASE LOTS
- EROSION CONTROL/DREDGING
- LONG TERM EXPANSION

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Following public and Advisory Committee review, the Draft Development Plan was revised in several ways. Project 6 was expanded to include both land acquisition and property redevelopment and Project J was expanded with a trail connection along Aircraft Drive to West North Lights Boulevard and the Coastal Trail.

Table 5-5: LHD Master Plan Development Plan Capital Improvement Program Projects

Project		Cost	Description
1	Resurface/reconstruct portions of Lakeshore Taxilane and west Lake Hood floatplane ramp	$4,510,000	Resurface or reconstruct several sections of Lakeshore Taxilane that currently have deteriorated pavement. Repair or replace the existing west floatplane ramp and address other facility needs for receiving, launching and tieing down aircraft during trailering.
2	Resurface/reconstruct Taxilane V	$8,800,000	Resurface and reconstruct deteriorated pavement on Taxilane V and replace its edge lights.
3	Fencing, cameras & lighting security/safety upgrades (area wide)	$2,000,000	Prepare and implement a plan of security and safety improvements, with input from users , FAA and other interested parties/agencies. Examples may include signage, marking, flashing lights, lighting, cameras, and fencing etc. at selective locations.
4	Continue erosion control/slip dredging projects	$6,200,000	Complete erosion control and dredging improvements for slips experiencing the highest rate of erosion (approximately 100 slips).
5	Repair/replace existing floatplane ramp	$700,000	Repair or replace the existing north floatplane ramp and address other facility needs for receiving, launching and tieing down aircraft during trailering.
6	Continue land acquisition and redevelopment in east Lake Spenard	$2,500,000	Acquire remaining private residential parcels on the east shore of Lake Spenard when property owners are ready to sell, and redevelop the acquired property and existing substandard slips with new slips and lease areas.
7	Construct parallel road & taxilane on Commercial Finger	$1,100,000	Construct a parallel road and taxilane along the Commercial Finger to reduce conflicts between aircraft and automobiles.

Project		Cost	Description
8	Rehabilitate gravel runway surface, improve drainage & replace lighting	$3,200,000	Rehabilitate the gravel runway surface, improve runway drainage, and replace lighting system.
9	Add floatplane ramp in Lake Hood	$500,000	Construct a new floatplane haulout ramp, most likely at the south shore of Lake Hood, to address wind issues and capacity at the existing ramps.
10A	East Runway 14-32 tie downs, taxiway, road & electrical	$9,000,000	Relocate Runway 14-32 gravel tie downs with parallel taxiway, road, and electric utilities to the east side of the runway.
10B	Lakeshore Drive & path relocation and taxilane connectors	$1,700,000	Relocate Lakeshore Drive, build a new adjacent pedestrian path, and construct taxilane connectors to the fingers to reduce conflicts between aircraft, automobiles, and pedestrians.
10C	Slip/lease lot area development	$4,700,000	Dig new slips and provide lease areas on top of the former tie down area and former Lakeshore Drive west of Runway 14-32. A net increase of 20 – 30 floatplane parking spots would be added under this plan.
11	Reconstruct and realign Taxiway H (parallel taxiway)	$1,500,000	Reconstruct or resurface Taxiway H, straighten the southern gravel section and establish a compliant taxiway object free area, and relocate affected tie downs.
12	Realign Taxiway H3	$200,000	Reconfigure angled Taxiway H3 to be 90 degrees to Taxiway H.
13	Fencing & gates for taxiway access to Runway 14/32	$1,000,000	Add fencing and gates to reduce unauthorized vehicle and pedestrian access to Runway 14/32.

During the master plan meetings and surveys, airport users noted that many improvements could be made to LHD by airport staff or with small projects that would not require a large capital project. Other improvements may be best implemented through no-cost management actions or by investments by private developers or from funding sources outside the airport. During the evaluation of master plan alternatives, the airport agreed that many of the projects in the alternatives could be completed outside of an FAA/airport funded capital improvement program project. These projects are listed and described below.

Table 5-6: LHD Master Plan Development Plan
Other Projects (Other Funding Sources or Management Actions)

Project		Description
A	Maintain existing facilities (area wide)	Maintain existing airport with staff resources and operating budget.
B	Identify and mitigate aircraft & structures from infringement on aircraft taxi routes	Widen the space for taxiing aircraft on roads by working with users to relocate parked aircraft and buildings, where possible.
C	Aircraft, auto, pedestrian separation, education, signage, flashing lights, markings & enforcement (area wide)	Reduce conflicts between aircraft, autos and pedestrians through signage, marking, flashing lights, etc. and education/enforcement.
D	Selective maintenance of waterlanes/taxi channel/fingers (area wide)	Deepen shallow areas of Lakes Hood and Spenard if/when needed using airport staff and operating budget resources.
E	Address runway visibility zone conflicts through modification of standards	Propose modification of standards for runway visibility zone conflicts to FAA, as recommended in prior master plan.
F	Address runway protection zone conflicts with lease lot management	Ongoing monitoring of development within runway protection zones to make sure incompatible development does not increase. It is not practical to remove existing development.
G	Enhance viewing areas at Spenard Beach & next to DOT&PF building	Improve public viewing areas at LHD to enhance the visitors' experience (informational displays about LHD history, businesses, economic impacts, and additional visitor amenities).
H	Expand run-up area	Widen the existing run-up area at Taxiway H4 so that aircraft getting on/off the runway can pass aircraft using the run-up area.
I	Lighting, electric service and/or fencing at transient slips	Add lighting, electrical plug-ins and fencing as needed at floatplane transient parking areas.
J	Pedestrian path on east side of Runway 14/32	Construct a new pedestrian path east of Runway 14-32 to reduce pedestrian conflicts in the Lakeshore Drive area and to provide access to the Coastal Trail.
K	Long term expansion of new lease lot/tie down space east and west of Echo parking and east of Runway 14-32	Private development of lease lots and airport development of tie downs, taxiway and road expansion as demand warrants.
L	Permanent pumped toilets	Replace porta potties with permanent pumped toilets.

Several projects were not recommended because the need was uncertain, the costs were high relative to benefits, or the issue could be best resolved outside the master plan. The projects not recommended, and a briefly explanation why, are summarized below.

Table 5-7: LHD Master Plan Projects not Recommended

Project		Explanation
B2	Widen E-W Waterlane; lower & resurface Gull Island	Waterlane length and width requirements to be revalidated in an upcoming update to the Seaplane Base Advisory Circular.
C5	Pave & drainage at Delta tie down	High water table and ground contamination make paving very expensive for a small number of affected tie downs. Gravel surfacing by airport staff under Project A is more feasible.
C7	Paint compass rose	Very limited user interest. Can be reconsidered and implemented under Project A if there is more interest in the future.
D3	Extend taxilane to more slips on Lake Spenard	The cost-benefit does not justify this project. The cost of this extension is very high and there are many existing slips with taxilane access to Runway 14-32 that can be used.
D7	Transient helipad at Lake Hood	Adequate helicopter facilities are available at ANC. Minimal user support for LHD heliport. Can be reconsidered and implemented if there is more interest in the future.
D11	Explore more ways to make lease lot development affordable	The airport is interesting in considering lease lot affordability ideas outside of the master plan.
D12	Boathouse expansion	Airport fire and rescue staff did not feel this was an urgent need, since the Development Plan did not include major slip expansion in Lake Spenard.

6.0 FACILITIES IMPLEMENTATION PLAN

6.1 Projected Capital Improvement Program Funding

The LHD Capital Improvement Program (CIP) is limited by the amount of funding likely to be received for LHD capital improvements. The CIP was developed based on a realistic but slightly optimistic projection of future capital improvement funding, as shown in Table 6-1 and as described below.

However, it is important to note the proposed CIP is dependent on receiving FAA Airport Improvement Program (AIP) grant money. If less AIP grant money is received than projected, the CIP will be developed more slowly. Conversely, increases in annual AIP grants would enable the CIP to progress more rapidly. Absent increases in user fees it is unlikely the CIP will progress at a pace faster than the availability of grants.

Most of LHD's funding for capital improvements comes from the FAA's AIP Program as Passenger Entitlements and Discretionary Funding. LHD currently receives $1 million per year in FAA AIP Passenger Entitlements. Passenger Entitlements are FAA funding approved by Congress that LHD is entitled to receive because it exceeds 10,000 annual passenger enplanements (passengers getting on airplanes) and because it has scheduled air service. If enplanements were to decline below 10,000, or scheduled services were to cease, LHD would receive far less in annual AIP funding.

LHD competes for FAA Discretionary AIP Funding with other airports based on FAA criteria which favors safety, security and rehabilitation projects for runways, taxiways and aprons. Over the past 15 years LHD has averaged about $600,000 per year in FAA Discretionary Funding. This Master Plan assumes an average of $875,000 per year in Discretionary Funding based on the assumption that LHD has competitive projects and Congress may increase the amount of Discretionary Funding over the next 20 years.

Airport Improvement Program (AIP) grants must be matched by roughly 6.25% in airport matching funding that comes from airport user fees. Annual AIP funding of $1,875,000 would

be matched by approximately $125,000 in airport funding. Together, this FAA AIP funding and airport match totals an average of $2 million per year. Over the 20 year Master Plan horizon, LHD could expect to receive approximately $40 million in CIP funding. These funding amounts guided the development of LHD's phased CIP.

Table 6-1: Lake Hood CIP Funding Projection

Funding Sources	Amounts
Current LHD Annual AIP Passenger Entitlements	$1,000,000
Recent LHD Annual Average AIP Discretionary Funding & Potential AIP Increases	$ 875,000
International Airport Revenue Fund AIP Match	$ 125,000
Average Annual CIP Funding Projection	$2,000,000

6.2 Capital Improvement Program Phasing Plan

The Master Plan Advisory Committee reviewed the Development Plan in Table 5-5, and projected funding amounts discussed in 6.1, and advised on the priority and timing of the projects. Subsequently, the project team considered FAA input on what projects would best compete for Discretionary Funding, and prepared a 20 year CIP Project Phasing Plan, shown in Figure 6-1. Because of the high costs of many of the projects, some had to be phased over several funding periods.

Short and medium term CIP projects were prioritized based on:

- surface condition issues (Lakeshore Taxilane, Taxilane V and existing floatplane ramps);
- safety (safety/security upgrades and parallel road and taxilane on Commercial Finger);
- user priorities (erosion control, safety/security upgrades); and
- continuing ongoing projects (erosion control, land acquisition, parallel road and taxilane on Commercial Finger).

Longer term projects were deferred to later years because:

- they were expensive and limited funding did not allow them to be built earlier (East Runway 14-32 tie downs, relocation of Lakeshore Drive, and new slips/lease areas);

- they were not needed yet (Runway 14-32 rehabilitation and lighting); or
- they required construction of new tie downs or taxiways prior to completing the project (reconstruct/realign Taxiway H, fencing and gates for Runway 14-32).

The entire CIP is estimated to cost over $47 million, which is $7 million over the estimated $40 million in funding over the next 20 years. Unless funding exceeds the $40 million projection, some CIP projects will be delayed beyond 20 years. About $44 million of the CIP would be funded with FAA AIP grants and nearly $3 million by the Airport.

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Capital Improvement Program Project Phasing	1-5 Years	6-10 Years	11-20 Years	20+ Years	Funding Source FAA	Funding Source Airport Match
1 **Resurface/reconstruct portions of Lakeshore Taxilane & west Lake Hood floatplane ramp** *Addresses existing surface condition problems.*	$4,510,000				$4,228,000	$282,000
2 **Resurface/reconstruct Taxilane V** *Addresses existing surface condition problems for this important connection between LHD and ANC.*	$2,300,000	$6,500,000			$8,250,000	$550,000
3 **Fencing, cameras & lighting security/safety upgrades (area wide)** *Detailed plan needed. High priority of users and FAA.*	$1,000,000	$1,000,000			$1,875,000	$125,000
4 **Continue erosion control/slip dredging projects** *High priority of users. In prior Master Plan.*	$500,000	$2,850,000	$2,850,000		$5,812,500	$387,500
5 **Repair/replace existing floatplane ramp** *Addresses user concerns about ramp condition.*	$700,000				$656,250	$43,750
6 **Continue land acquisition and redevelopment in east Lake Spenard** *In prior Master Plan.*	$800,000	$800,000	$900,000		$2,343,750	$156,250
7 **Construct parallel road & taxilane on commercial finger** *Separates aircraft and automobiles. In prior Master Plan.*	$1,100,000				$1,031,250	$68,750
8 **Rehab runway surface, improve drainage & replace lighting** *Major rehabilitation needed every 15 - 20 years.*			$3,200,000		$3,000,000	$200,000
9 **Add floatplane ramp in Lake Hood** *In prior Master Plan.*			$500,000		$468,750	$31,250
10 **Tie down & Lakeshore Drive relocation & lease lot/slip expansion**						
10A **East Runway 14/32 tie downs, taxiway, road & electrical** *Tie down relocation is needed before Taxiway H is realigned and Lakeshore Drive is relocated.*			$9,000,000		$8,437,500	$562,500
10B **Lakeshore Drive & path relocation and taxiway connectors** *Separates aircraft, automobiles, and pedestrians.*			$1,700,000		$1,593,750	$106,250
10C **Slip/lease area development** *High priority of users.*				$4,700,000	$4,406,250	$293,750
11 **Reconstruct & realign Taxiway H (parallel taxiway)** *Addresses FAA standards and surface condition. Priority of FAA.*			$1,500,000		$1,406,250	$93,750
12 **Realign Taxiway H3** *Addresses FAA standards. Construct with Taxiway H.*			$200,000		$187,500	$12,500
13 **Fencing & gates for taxiway access to Runway 14/32** *High priority of FAA to prevent incursions. Build after connectors are built.*				$1,000,000	$937,500	$62,500
TOTAL	$10,910,000	$11,150,000	$19,850,000	$5,700,000		
				$47,610,000	**$44,634,250**	**$2,975,750**

Figure 6-1: Capital Improvements Phasing Figure

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6.3 Implementation Considerations

The scope, master plan concept, and cost estimates of most projects will need to be reconfirmed prior to requesting funding. Many projects will require some additional planning, environmental documentation, design, and coordination with users, FAA and others about design features and ongoing operations during construction.

The following Tables 6-2 and 6-3 describe the projects, their costs, and information that should be considered in determining specific funding years, final scope and budget, and potential operations issues.

Table 6-2: LHD Master Plan Development Plan
CIP Projects Implementation Considerations

Project/Description/Cost		Implementation Considerations
1	**Project:** Resurface/reconstruct portions of Lakeshore Taxilane and west Lake Hood floatplane ramp. **Description:** Resurface or reconstruct several sections of Lakeshore Taxilane that have deteriorated pavement. Repair or replace the existing west floatplane ramp and address other facility needs for receiving, launching and tieing down aircraft during trailering. **Cost:** $4,510,000	**Timing**: Scheduled for 2017 construction; existing pavement problems. **Preparatory Activities**: Design, environmental clearances, user coordination, particularly on ramp design features and amenities. **Interrelationships Between Projects**: West ramp design features could also be applied to the north ramp. **Operational Issues**: How to maintain Lakeshore Taxilane access during construction. Consider needs of amphibious aircraft in ramp design. Provide tie down area on shore or dock to temporarily hold aircraft while getting or parking trailer. **Other Considerations**: None.
2	**Project:** Resurface/reconstruct Taxilane V **Description:** Resurface and reconstruct Taxilane V and replace its edge lights. **Cost:** $8,800,000	**Timing**: Begin in 1-5 year period; existing pavement and subsurface problems; large expensive project with phased grant extending into 6-10 year period. **Preparatory Activities**: Design, environmental clearances. **Interrelationships Between Projects**: None. **Operational Issues**: How to maintain taxiway access between ANC and LHD during construction. Avoiding disruptions to vehicle traffic on Postmark Drive, Aircraft Drive, and Postmark Tug Road. **Other Considerations**: Will funding come from LHD AIP funding or ANC or both?

Project/Description/Cost		Implementation Considerations
3	**Project:** Fencing, cameras & lighting security/safety upgrades (area wide) **Description:** Prepare a plan and design with user, FAA, RSAT & others to address safety concerns. Examples may include signage, marking, flashing lights, lighting, cameras, and fencing etc. at selective locations. **Cost:** $2,000,000	**Timing**: Phased over 1-5 and 6-10 year periods. **Preparatory Activities**: Prepare a plan and design with user, FAA, and other parties/agencies involvement. Identify critical areas and standards for signs, marking, and lighting. **Interrelationships Between Projects**: Avoid expensive investments in some areas if they will be demolished by another future project. **Operational Issues**: Work with FAA, RSAT, and others to address safety concerns. **Other Considerations**: Some small measures such as marking or limited signage may be more quickly funded using operating funds or Annual Improvements under Project C. Some upgrades may be ineligible for FAA funding.
4	**Project:** Continue erosion control/slip dredging projects **Description:** Complete erosion control and dredging improvements for slips experiencing the highest rate of erosion (approximately 100 slips). **Cost:** $6,200,000	**Timing**: Phased over all planning periods with design in years 1-5. **Preparatory Activities**: Design and environmental clearances. Revisit the performance and cost-effectiveness of the previous erosion control design. **Interrelationships Between Projects**: South Lake Hood erosion control would occur in an area proposed for a new floatplane ramp. **Operational Issues**: Consider increasing slip depth/space, as needed, to allow for a floatplane and wheeled plane to park on slips on Lake Hood, for slips with access to Hood Strip. Provide interim parking space for slipholders affected by the construction. **Other Considerations**: Some users recommended examining less expensive designs and consideration of wider slips with softer surfaces to aid in the mooring of floatplanes, especially slips more exposed to winds. Some users are happy with the current slips and do not see the need for renovations.
5	**Project:** Repair/replace existing floatplane ramp **Description:** Repair or replace the existing north floatplane ramp and address other facility needs for receiving, launching and tieing down aircraft during trailering. **Cost:** $700,000	**Timing**: 1-5 year period. **Preparatory Activities**: Design, environmental clearances, user coordination, particularly on ramp design features and amenities. **Interrelationships Between Projects**: West ramp design features could also be applied to the north ramp. **Operational Issues**: Fix depth, hump in middle, and length of ramp. Consider needs of amphibious aircraft. Provide tie down area on shore or dock to temporarily hold aircraft while getting or parking trailer. Consider adding improved gravel surfaces and drainage to uplands areas. **Other Considerations**: None.

	Project/Description/Cost	Implementation Considerations
6	**Project:** Continue land acquisition and redevelopment in east Lake Spenard **Description:** Acquire remaining private residential parcels on the east shore of Lake Spenard as property becomes available. Prepare a plan and redevelop the acquired property and some of the adjacent substandard slips and taxi channels to the slips. **Cost:** $2,500,000	**Timing**: Phased over all planning periods when property owners are wanting to sell. **Preparatory Activities**: Environmental clearances and appraisals prior to acquisition. **Interrelationships Between Projects**: None **Operational Issues**: None **Other Considerations**: How should the acquired property be used in the interim? The Airport needs to determine how the east Lake Spenard area should be redeveloped.
7	**Project:** Construct parallel road & taxilane on Commercial Finger **Description:** Construct a parallel road and taxilane along the Commercial Finger to reduce conflicts between aircraft and automobiles. **Cost:** $1,100,000	**Timing**: 1-5 year period. **Preparatory Activities**: Design, environmental clearances, and user coordination, particularly on slip building relocation, access changes to slips and lease lots, utilities and drainage, and access during construction. **Interrelationships Between Projects**: Related to prior slip erosion control project that widened the space available for the road and taxilane, but it did not relocate slip buildings to their ultimate locations. Consider whether a gate/fence should be built at the connector where aircraft access Runway 14-32. **Operational Issues**: Access during construction. **Other Considerations**: Lease lots in the area are already small, given the size of buildings and amount of aircraft and vehicle parking. Some tenants are currently using space off of their lease lot for airplane and vehicle parking, that they will lose when this project is built. Some informal public parking areas will also be lost when this project is built. Should other options such as a wide road with pull-out areas and flashing lights, signs, and/or a gate at the entrance to the finger be considered during design? Consider how the taxilane connector to runway 14-32 works with taxilane access to the fuel area.
8	**Project:** Rehabilitate gravel runway surface, improve drainage & replace lighting **Description:** Rehabilitate the gravel runway surface, improve runway drainage, and replace lighting system. **Cost:** $3,200,000	**Timing**: 11 – 20 year period, when needed based on the airport's ability to maintain the existing runway surface and lighting system. **Preparatory Activities**: Design, environmental clearances, user and ATC coordination on conducting operations during construction. **Interrelationships Between Projects**: None **Operational Issues**: Conducting operations during construction. **Other Considerations**: Some user complaints that the runway is currently soft and has larger than desired rocks. Continue to monitor and, if needed, either conduct a higher level of interim maintenance or move up the schedule for this project.

Project/Description/Cost		Implementation Considerations
9	**Project:** Add floatplane ramp in Lake Hood **Description:** Construct a new floatplane haulout ramp, most likely at the south shore of Lake Hood, to address wind issues and capacity at the existing ramps. **Cost:** $500,000	**Timing**: 11 – 20 year period. **Preparatory Activities**: Design, environmental clearances. Relocate affected tie downs. **Interrelationships Between Projects**: Slip erosion control in the same area. West ramp design features could also be applied to the new south ramp. **Operational Issues**: Consider needs of amphibious aircraft. Provide tie down area on shore or dock to temporarily hold aircraft while getting or parking trailer. **Other Considerations**: Potential net loss or displacement of slips in the area.
10A	**Project:** East Runway 14-32 tie downs, taxiway, road & electrical **Description:** Relocate Runway 14-32 gravel tie downs with parallel taxiway, road, and electric utilities to the east side of the runway. **Cost:** $9,000,000	**Timing**: 11 – 20 year period, prior to 10B and 10C. **Preparatory Activities**: Design, environmental clearances – mostly likely an environmental assessment and wetlands permit. **Interrelationships Between Projects**: This project is needed before 10B, 10C, 11, and 13 to replace tie downs affected by these projects. **Operational Issues**: The FAA ATC has expressed concerns that a partial parallel taxiway will require more runway crossings and encourage incursions. They recommend a full parallel taxiway be built with this project instead of an initial partial parallel taxiway. A full parallel taxiway would cost more than a partial parallel taxiway and may not be affordable during the 20-year planning period unless FAA provides more discretionary funding. **Other Considerations**: Several potential lessees have already expressed interest in developing east of Hood Strip. Consider accelerating the taxiway, road and utility portions of this project to support lease lot development. Turnagain Community Council has opposed this project.
10B	**Project:** Lakeshore Drive & path relocation and taxilane connectors **Description:** Relocate Lakeshore Drive, build a new adjacent trail, and construct taxilane connectors to the fingers to reduce conflicts between aircraft, automobiles and pedestrians. **Cost:** $1,700,000	**Timing**: 11 – 20 year period, prior to 10C and 13. **Preparatory Activities**: Design, environmental clearances – mostly likely part of the environmental assessment for 10A. Prepare a plan to acquire lease space from the Lot 12, Block 17 lease or trade adjacent tie down space for this lease space. **Interrelationships Between Projects**: This project is needed before 10C and 13 are completed. Consider constructing Project 13 with this project. This new taxilane connector would link to Project B and the narrower finger roads used by some wheeled aircraft to access Runway 14-32.

Project/Description/Cost		Implementation Considerations
		Operational Issues: During design, consider whether the trail should be on the east (runway) or west (parked aircraft) sides of Lakeshore Drive to manage safety and reduce incursions, and how it will connect to the existing trail. Design should address detailed design features of road/taxilane crossings for line of sight, signage, flashing lights, etc. **Other Considerations**: Slips between the fingers along Lakeshore Drive will not have direct access to the connectors. This could be addressed by providing deeper slips in these areas to maneuver wheeled aircraft along the back of the slips to the connectors, or by limiting use to only floatplanes, or requiring aircraft to be trailered or escorted. Turnagain Community Council has opposed this project.
10C	**Project:** Slip/lease lot area development **Description:** Dig new slips and provide lease areas on top of the former tie down area and former Lakeshore Drive west of Runway 14-32. **Cost:** $4,700,000	**Timing**: Beyond 20 years, unless funding permits earlier construction. **Preparatory Activities**: Design, environmental clearances – mostly likely part of the environmental assessment for 10A. Prepare a plan to acquire lease space from Lot 9, Block 17 for slip expansion and possibly trade for additional lease space to the north. Determine if waterfront space near Alaska Aircraft Sales will be added to their lease or developed as new slips. **Interrelationships Between Projects**: Linked to 10A and 10B which would be completed first. **Operational Issues**: Provide interim space for slipholders affected by the construction. **Other Considerations**: Turnagain Community Council has opposed this project.
11	**Project:** Reconstruct and realign Taxiway H (parallel taxiway) **Description:** Reconstruct or resurface Taxiway H, straighten the southern gravel section and establish a compliant taxiway object free area, and relocate affected tie downs. **Cost:** $1,500,000	**Timing**: 11 – 20 year period. **Preparatory Activities**: Design, environmental clearances, confirmation if the taxiway surface will be gravel or asphalt. **Interrelationships Between Projects**: Project 10A should be built before this project so that tie downs affected by this project can be relocated to the new tie down area. Another option would be to relocate tie downs to the vehicle parking area along Lakeshore Drive and/or to a small expansion of Echo parking to the east. May want to construct with Project 12, realignment of Taxiway H3 to minimize operational impacts. **Operational Issues**: How to maintain taxiway access to Runway 14-32 during construction. **Other Considerations**: None.
12	**Project:** Realign Taxiway H3 **Description:** Reconfigure angled Taxiway H3 to be 90 degrees to Taxiway H. **Cost:** $200,000	**Timing**: 11 – 20 year period. **Preparatory Activities**: Design, environmental clearances. **Interrelationships Between Projects**: May want to construct with Project 11, Realign and Reconstruct Taxiway H, to minimize operational impacts. **Operational Issues**: Reconfirm with FAA that H3 is in the best location for operational safety during design. **Other Considerations**: None.

Project/Description/Cost		Implementation Considerations
13	**Project:** Fencing & gates for taxiway access to Runway 14/32 **Description:** Add fencing and gates to reduce unauthorized vehicle and pedestrian access to Runway 14/32. **Cost:** $1,000,000	**Timing**: 11 – 20 year period. **Preparatory Activities**: Design, environmental clearances. **Interrelationships Between Projects**: Consider building fencing and gates when new connectors in Projects 7, 10A and 10B are constructed. **Operational Issues**: Position gates so that there is adequate space to hold an aircraft without impacting other airport operations. **Other Considerations**: None.

Table 6-3: LHD Master Plan Development Plan
Other Recommended Projects Implementation Considerations

	Project	Implementation Considerations
A	**Project:** Maintain existing facilities (area wide) **Description:** Maintain existing airport with staff resources and operating budget. **Implementation Funding/Responsibility:** Operating budget/airport staff	**Timing**: Ongoing. **Preparatory Activities**: User coordination. **Interrelationships Between Projects**: Maintenance affects the timing/need for many of the CIP projects. **Operational/Other Considerations**: None.
B	**Project:** Identify and mitigate aircraft & structures from infringement on aircraft taxi routes **Description:** Widen the space for taxiing aircraft on roads by working with users to relocate parked aircraft and buildings, where possible. Mark the boundary of the slip/road right-of-way to prevent future infringement. **Implementation Funding/Responsibility:** Operating budget/airport staff and users.	**Timing**: Next 5 years. **Preparatory Activities**: Determine achievable road/taxi route area and boundary, coordinate with users, mark the boundary. **Interrelationships Between Projects**: Related to connectors built with Projects 7, 10A and 10B. Should be integrated with signage, marking, etc with Projects C and 3. **Operational/Other Considerations**: If these measures are not practical or effective on all fingers, consider other options such as limiting taxiing wheeled aircraft from only selective areas.
C	**Project:** Aircraft, auto, pedestrian separation, education, signage, flashing lights, markings & enforcement (area wide) **Description:** Reduce conflicts between aircraft, autos and pedestrians through signage, marking, flashing lights, etc. and education/enforcement. **Implementation Funding/Responsibility:** Operating budget/airport staff and users	**Timing**: Next 5 years. **Preparatory Activities**: Develop overall strategy and consistent standards for marking, signage and lighting; user coordination. **Interrelationships Between Projects**: Related to Projects 3, 7, 10A, 10B, and B that address connectors, taxiing on roads, and safety/security measures. **Operational/Other Considerations**: None.
D	**Project:** Selective maintenance of waterlanes/taxi channel/fingers (area wide) **Description:** Deepen shallow areas of Lakes Hood and Spenard, when needed. **Implementation Funding/Responsibility:** Operating budget/airport staff	**Timing**: As needed. **Preparatory Activities**: Monitor with user input; permitting as needed. **Interrelationships Between Projects**: None. **Operational/Other Considerations**: Coordinate with ATC and users when working within waterlanes and taxi channels.

Project		Implementation Considerations
E	**Project:** Address runway visibility zone conflicts through modification of standards **Description:** Propose modification of standards for runway visibility zone conflicts to FAA, as recommended in prior master plan. **Implementation Funding/Responsibility:** Airport staff	**Timing**: Following ALP approval. **Preparatory Activities**: Prepare request and discuss with FAA Airports Division. **Interrelationships Between Projects**: None. **Operational/Other Considerations**: Monitor the updated SPB AC to determine whether runway visibility zone is applicable to a SPB.
F	**Project:** Address runway protection zone conflicts with lease lot management **Description:** Ongoing monitoring of development within runway protection zones to make sure incompatible development does not increase. It is not practical to remove existing development. **Implementation Funding/Responsibility:** Airport staff	**Timing**: When lease development is proposed. **Preparatory Activities**: User coordination. **Interrelationships Between Projects**: None. **Operational/Other Considerations**: Consider proactive outreach to affected users to avoid their spending time and money on planning building expansions only to have them be rejected. Monitor the updated SPB AC to determine whether a runway protection zone is applicable to a SPB.
G	**Project:** Enhance viewing areas at Spenard Beach & next to DOT&PF building **Description:** Improve public viewing areas at LHD to enhance the visitors' experience (informational displays about LHD history, businesses, economic impacts and additional visitor amenities). Consider partnering with the MOA Parks Department or the Aviation Heritage Museum. **Implementation Funding/Responsibility:** Operating budget/airport staff, potentially other agencies like MOA Parks and Museum	**Timing**: Next 5 years. **Preparatory Activities**: Develop plan with involvement of partner agencies such as the MOA Parks and Aviation Museum. **Interrelationships Between Projects**: None. **Operational/Other Considerations**: Consider Part 77, avoiding bird attractions, any potential effects of changes to the SPB AC on widening the E-W taxi channel, and increased traffic/parking needs.
H	**Project:** Expand run-up area **Description:** Widen the existing run-up area at Taxiway H4 so that aircraft can pass each other. **Implementation Funding/Responsibility:** Operating budget/airport staff	**Timing**: Next 5 years. **Preparatory Activities**: Design concept; user/ATC coordination. **Interrelationships Between Projects**: Projects 10B and 11. **Operational/Other Considerations**: Managing operations during construction; avoiding prop blast on adjacent lease area and tie downs.

	Project	Implementation Considerations
I	**Project:** Lighting, electric service and/or fencing at transient slips **Description:** Add lighting, electrical plug-ins and fencing as needed at floatplane transient parking areas. **Implementation Funding/Responsibility:** Operating budget/airport staff	**Timing**: Next 5 years. **Preparatory Activities**: User coordination to confirm extent of improvements needed. **Interrelationships Between Projects**: None. **Operational/Other Considerations**: Users also report that some of the uplands areas next to the slips are wet and need fill.
J	**Project:** Pedestrian route on east side of Runway 14/32 **Description:** Construct a new pedestrian route east of Runway 14-32 to reduce pedestrian conflicts in the Lakeshore Drive area and to provide access to the Coastal Trail. **Implementation Funding/Responsibility:** Funding from other entities like the MOA Parks and AMATS. Airport may be able to donate waste fill from other projects.	**Timing**: When funding is obtained. **Preparatory Activities**: Work with the MOA and neighborhood. **Interrelationships Between Projects**: In same vicinity as Project 10. **Operational/Other Considerations**: Consider whether to construct with the noise berm recommended in the Part 150 Noise Study. Turnagain Community Council has opposed this project.
K	**Project:** Long term expansion of new lease lot/tie down space east and west of Echo parking and east of Runway 14-32 **Description:** Private development of lease lots and airport development of tie downs, taxiway and road expansion as demand warrants. **Implementation Funding/Responsibility:** Airport provide taxiway and road access and build additional tie downs, if needed. Airport and tenants work together to examine options to reduce lease lot development costs. Tenants develop lease lots.	**Timing**: When needed. **Preparatory Activities**: Environmental clearances; user and neighborhood coordination. **Interrelationships Between Projects**: Projects 10 and J. **Operational/Other Considerations**: Helio Place road access would be eliminated with the westward expansion of Echo Parking. The ANC Master Plan proposed relocation of Postmark to the east, which would provide new road access to the west end of this expansion of Echo parking and lease area. The ANC/LHD boundary should change with the westward expansion of Echo Parking. Turnagain Community Council has opposed this project.
L	**Project:** Permanent pumped toilets **Description:** Replace porta potties with permanent pumped toilets. **Implementation Funding/Responsibility:** Operating budget/airport staff	**Timing**: As funding and need allow. **Preparatory Activities**: User coordination. **Interrelationships Between Projects**: Consider incorporating into new construction such as during Project 10A. **Operational/Other Considerations**: None.

6.4 Other Considerations for Future LHD Planning/Implementation

Airport staff should monitor several events that may require adjustments or refinements to future planning and development of LHD. These include:

- **Updated Seaplane Base AC**. The FAA intends to update the Sea Plane Base AC over the next few years. Several areas in the existing AC that deserve special attention at LHD include waterlane length, width, depth, and approach surfaces and water taxi channel dimensions and setbacks. Other standards not addressed in the current AC including RPZ and RVZ should also be monitored. The timing of the next LHD MP and/or ALP update may depend on how this AC is changed.

- **Obstruction Lighting/Obstruction Removal**. Given the presence of buildings within the approach surfaces and potential future runway protection zones, the Airport should consider adding obstruction lighting to selective buildings along the shore near the ends of the waterlanes in the approach and departure paths - see section 2.5 of the Sea Plane Base AC. The Airport Layout Plan documents many other obstructions to be removed (vegetation) or relocated (signs).

- **East Lake Spenard Development**. The Airport plans to continue to acquire land on the northeast shore of Lake Spenard. Once remaining private properties are acquired the airport will need to identify how to best use the property. Factors to consider include the potential to service tourists in the Spenard commercial area, demand for lease lots and slips, and the current mix of residential buildings and substandard slips and taxi channels in the northeast part of the Lake. The Airport should also consider the best interim use of the property, prior to when the properties are all acquired.

- **Other Lake Spenard Developable Properties**. Several other properties on Lake Spenard could be more fully developed and used for aeronautical purposes, taking into account future user needs and interest. The parcels on either side of the Spenard Beach could be redeveloped as lease lots and the transient parking relocated to another place. However, given the neighborhood across the street, the scale and type of development may need to be limited. The parking lot east of the DOT&PF building on the south side

of Lake Spenard could be redeveloped as a lease lot or dry dock parking area. This could require relocating Aviation Avenue and converting several slips to lease lot space or a dry dock ramp. Currently there is dry dock parking available at Alpha and Bravo Parking, with wheeled access to Hood Strip, so additional dry dock parking is not immediately needed. Any hangars in south Lake Spenard would need to have a tower line of sight study to be sure the hangar does not block the tower's view of the south side of Lake Spenard. Lack of wheeled aircraft access to these Spenard Lake properties may make these properties less attractive to leaseholders. Additionally, the FAA property west of the DOT&PF building that is currently being used for outdoor storage could be redeveloped for better purposes. Aircraft access and proximity to waterlanes might limit aeronautical uses; however, its central location on the lakeshore could make it a valuable property for airport or leaseholder development. If the DOT&PF parking lot east of the DOT&PF were needed for a future dry dock or lease area east of DOT&PF, the DOT&PF parking could be relocated into this FAA parcel west of DOT&PF.

- **Dry Dock Parking**. Dry dock parking is more easily developed than constructing more slips at LHD. The airport should monitor interest in dry dock parking, and as demand warrants, shift some wheeled aircraft parking from Alpha and Bravo Parking areas (near the west ramp) to other locations to free up space for dry dock parking.

- **LHD Offices**. The future location of LHD offices should either remain on the existing subleased property, be relocated to space at Field Maintenance next to LHD, or be relocated next to Spenard Beach, east of the DOT&PF building, or in East Lake Spenard. If moved, the location should allow commensurate airfield supervision with a central location, airfield visibility, monitoring and access, communications and connectivity, office space, parking and user facilities.

- **Taxiway/Taxi Route Markings**. Lakeshore Taxilane has a high level of activity and a large number of buildings and parked aircraft along the taxilane. The airport should mark the edge of the taxilane object free area to make sure structures and parked aircraft are not

hazards for taxiing aircraft. The airport should consider marking the finger taxi routes to show areas that should remain clear of parked aircraft and buildings.

- **E-W Taxi Channel Width**. The E-W Taxi Channel and finger channels do not meet standards for taxi channels with passing aircraft. The airport should consider adding a note to the NOTAMs and Operational Orders noting the limited widths for passing aircraft within taxi channels.

- **Runway 32 RPZ**. The FAA's guidance on land uses within RPZ's recommends avoiding introducing new or modifying/expanding existing incompatible land uses within an RPZ and removing or mitigating existing incompatible uses, if practical. The LHD Master Plan evaluated ways to remove or mitigate Lakeshore Drive, the finger roads, and slips within the Runway 32 RPZ. Options included relocating the runway and closing the road. Relocating the runway was considered but dismissed in the 2006 Master Plan, primarily based on the air traffic controllers' review that it would conflict with ANC operations, would create conflicts between LHD waterlane and runway operations, it would reduce visibility from the tower, it would lower general aviation operations over Knik Arm, and it would relocate touch and go patterns and noise closer to the adjacent neighborhood.

  Closing Lakeshore Drive and the finger roads is not practical because there is no other way to access tie downs, slips and lease areas. Closing Lakeshore Drive to public traffic was considered but dismissed in the 2006 Master Plan because of public and user support for public access as well as the need for the public to access lease areas for flightseeing and other commercial activities. Lowering the roads is not practical because of the high water table in the area and because lowered roads would eliminate direct access from the road to adjacent areas.

  To mitigate the presence of floatplane slips in the RPZ, the airport should not allow commercial permits or slips in this area, as commercial permits would tend to increase the number of people within the RPZ compared to non-commercial slips that would tend to attract fewer people.

7.0 INITIAL ENVIRONMENTAL ANALYSIS

7.1 Introduction

This section assesses the potential for environmental impacts and additional analysis or permits required for the CIP projects described in Chapter 6 and Figure 6-1, based on environmental categories identified by FAA Order 1050.1F. Additional background on environmental conditions at LHD can be found in Section 2.8. For the purposes of this environmental analysis, it is assumed all CIP projects would be funded by the FAA or otherwise require an FAA action, thus necessitating environmental documentation required under the National Environmental Policy Act (NEPA).

Most CIP projects are anticipated to require a Categorical Exclusion (CE), per FAA Order 1050.1F paragraph 5-1; however, the class of action would be determined by the responsible FAA official, who may determine "extraordinary circumstances" exist, and require an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

Few of the CIP projects are anticipated to have extraordinary circumstances or result in significant environmental impacts. An extraordinary circumstance exists if a proposed action involves any of the following:

- An adverse effect on cultural resources protected under the National Historic Preservation Act of 1966;
- An impact on properties protected under Section 4(f);
- An impact on natural, ecological, or scenic resources of Federal, state, tribal, or local significance;
- An impact on the following resources:
  - resources protected by the Fish and Wildlife Coordination Act;
  - wetlands;
  - floodplains;
  - coastal zones;

- national marine sanctuaries;
- wilderness areas;
- National Resource Conservation Service-designated prime and unique farmlands;
- energy supply and natural resources; or
- resources protected under the Wild and Scenic Rivers Act, and rivers or river segments listed on the Nationwide Rivers Inventory (NRI); and
- solid waste management

- A division or disruption of an established community, or a disruption of orderly, planned development, or an inconsistency with plans or goals that have been adopted by the community in which the project is located;
- An increase in congestion from surface transportation;
- An impact on noise levels of noise sensitive areas;
- An impact on air quality or violation of Federal, state, tribal, or local air quality standards under the Clean Air Act;
- An impact on water quality, sole source aquifers, a public water supply system, or state or tribal water quality standards established under the Clean Water Act, and the Safe Drinking Water Act;
- Impacts on the quality of the human environment which are likely to be highly controversial on environmental grounds. The term "highly controversial on environmental grounds" means there is a substantial dispute involving reasonable disagreement over the degree, extent, or nature of a proposed action's environmental impacts or over the action's risks of causing environmental harm;
- Likelihood to be inconsistent with any Federal, state, tribal, or local law relating to the environmental aspects of the proposed action; or
- Likelihood to directly, indirectly, or cumulatively create a significant impact on the human environment, including, but not limited to, actions likely to cause a significant

lighting impact on residential areas or commercial use of business properties, likely to cause a significant impact on the visual nature of surrounding land uses, likely to cause environmental contamination by hazardous materials, or likely to disturb an existing hazardous material contamination site such that new environmental contamination risks are created.

Under paragraph 5-6 (1050.1f) are a list of actions that are typically covered by CEs. The following are actions from this list applicable to most, if not all, of the CIP projects:

- Actions involving acquisition, repair, replacement, maintenance, or upgrading of grounds, infrastructure, buildings, structures, or facilities that generally are minor in nature.
- Acquisition of land and relocation associated with a categorically excluded action.
- Federal financial assistance, licensing, or ALP approval for the following actions, provided the action would not result in significant erosion or sedimentation, and will not result in a significant noise increase over noise sensitive areas or result in significant impacts on air quality.
  - Construction, repair, reconstruction, resurfacing, extending, strengthening, or widening of a taxiway, apron, loading ramp, or runway safety area (RSA), including an RSA using Engineered Material Arresting System (EMAS); or
  - Reconstruction, resurfacing, extending, strengthening, or widening of an existing runway.
- Placing earthen fill into previously excavated land with material compatible with the natural features of the site, provided the land is not delineated as a wetland; or minor dredging or filling of wetlands or navigable waters for any categorically excluded action, provided the fill is of material compatible with the natural features of the site, and the dredging and filling qualifies for an U.S. Army Corps of Engineers nationwide or a regional general permit.

Each CIP project will need to be evaluated for potential impacts to environmental categories per Chapter 4 of 1050.1f. Most of these categories have associated impact thresholds, which are included in Section 7.2.

For some CIP projects, it is clear that no impact will occur within particular categories due to the lack of environmental resources present in the project area. Additionally, some resource categories are not present anywhere at LHD (Coastal Resources, Farmlands, and Wild and Scenic rivers); therefore no impacts are anticipated for these.

For other categories, only minor impacts are anticipated. Minor impacts are those which do not meet impact thresholds or require a permit, but will require documentation of the analysis. For most CIP projects, analysis in the CE would be necessary to determine if impacts exist, and to what extent. Additionally, most CIP projects are anticipated to require either a flood hazard permit or a Section 404 permit, due to work under the ordinary high water mark, or for fill in wetlands. Those projects requiring Section 404 permits are anticipated to qualify for a Nationwide Permit.

Table 7-1 summarizes the potential for impacts and analysis or permits required for each Lake Hood Master Plan CIP project and environmental category.

Table 7-1: LHD Master Plan CIP Projects and Applicable Environmental Categories

CIP Project	Air Quality	Biological resources (including fish, wildlife, and plants)	Climate	Coastal resources	Section 4(f)	Farmlands	Hazardous materials, solid waste, and pollution prevention	Historical, architectural, archeological, and cultural resources	Land use	Natural resources and energy supply	Noise and compatible land use	Socioeconomics, environmental justice, and children's environmental health and safety risks	Visual effects	Water resources (including wetlands, floodplains, surface waters, groundwater, and wild and scenic rivers)
1	m	m	m	N/A	N/A	N/A	A	m		m	m	m		I
2	m	m	m				A	m		m	m	m		
3	m	m	m				m	m	m	m	m	m	m	I
4	m	m	m				A	m		m	m	m		I
5	m	m	m				m	A		m	m	m		I
6	m	A	m				A	m	A	m	m	m	m	I
7	m	m	m				A	m		m	m	m	m	m
8	m	m	m				m	m		m	m	m		m
9	m	m	m				A	A		m	m	m	m	I
10A	m	A	m				m	m	A	m	A	m	A	I
10B	m	m	m				m	m		m	m	m	m	I
10C	m	m	m				m	m		m	m	m	m	I
11	m	m	m				m	m		m	m	m		m
12	m	m	m				m	m		m	m	m		m
13	m	m	m				m	m		m	m	m		I

"m" denotes negligible to minor impacts
"A" denotes need for additional analysis to determine impacts
"I" denotes impact anticipated or permit required

7.2 Environmental Analysis

Coastal resources, farmlands, and Wild and Scenic Rivers are not present in the LHD project area and will not be discussed in this plan.

Section 4(f) of the Department of Transportation Act is designed to protect public recreation lands from being incorporated into transportation facilities and to protect the activities, features or attributes of the resource from being diminished. Resources protected by Section 4(f) are publicly owned parks, recreation areas, wildlife and waterfowl refuge of national, state, or local significance; and historic sites of national, state, or local significance. Substantial

impairment occurs when the activities, features, or attributes of the resource that contribute to its significance or enjoyment are substantially diminished. Use of a Section 4(f) property occurs:

1. When land is permanently incorporated into a transportation facility;

2. When there is a temporary occupancy of land that is adverse in terms of the statutes' preservation purpose; or

3. When there is a constructive use (a project's proximity impacts are so severe the protected activities, features, or attributes of a property are substantially impaired).

Although there is recreational use on LHD properties, such as Spenard Beach and the roads around the lakes, these areas are airport property and already part of a transportation facility designated for aircraft use. The 1996 LHD Master Plan noted Spenard Beach as a "possible" 4(f) area. Spenard Beach is already part of a transportation facility, and has been since it was acquired by condemnation in 1975. The transfer document in 1975 did not contain any language reserving this area for park or recreation use. Since this area is already part of a transportation facility and used for general aviation operations, it appears that this area would not be subject to Section 4(f).

In the event that Spenard Beach was to be found subject to Section 4(f), the proposed CIP projects would not be anticipated to change current uses or enjoyment of the area and it is anticipated that a "no use" or "de minimis" finding would be obtainable.

7.2.1 Air Quality

NEPA Significance Threshold: The action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards, as established by the Environmental Protection Agency under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations.

Background on air quality conditions at LHD can be found in Section 2.8.3.

Most of the CIP projects involve upgrades and revitalization of current airport property. None of the CIP projects are anticipated to result in a significant increase in the number or type of aircraft operations. CIP projects 10A, 10B, and 10C would change the location of airport operations, making them closer to nearby residential areas, but it is unlikely the projects would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards for any of the time periods analyzed.

Compliance with state and federal air quality regulations should minimize any adverse effects resulting from the CIP projects.

7.2.2 Biological Resources (Including Fish, Wildlife, and Plants)

NEPA Significance Threshold: The U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service determines that the action would be likely to jeopardize the continued existence of a federally listed threatened or endangered species, or would result in the destruction or adverse modification of federally designated critical habitat. The FAA has not established a significance threshold for non-listed species.

Factors to Consider: Whether the action would have the potential for:

- A long-term or permanent loss of unlisted plant or wildlife species, i.e., extirpation of the species from a large project area (e.g., a new commercial service airport);
- Adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats;
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or
- Adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance.

There are no listed federally threatened or endangered species in the project area.

Undeveloped land and water bodies within, and adjacent to LHD, provide habitat for a wide variety of wildlife and birds. Wetlands areas near LHD, such as Turnagain Bog, provide feeding, breeding, and resting habitat for waterfowl and shorebirds such as the green-winged teal (*Anas carolinesis*), greater and lesser scaup (*Aythya marila* and *Aythya affinis*), northern pintail (*Anas acuta*), Canada goose (*Branta Canadensis*), American widgeon (*Anas americana*), mallard (*Anas platyrhynchos*), northern shoveler (*Anas clypeata*), red-necked phalarope (*Phalaropus lobatus*), lesser yellowlegs (*Tringa flavipes*), common snipe (*Gallinago gallinago*), and short-billed dowitcher (*Limnodroumus griseus*). Surveys by the U.S. Fish and Wildlife Service have identified a few bald eagle nests within the ANC property, though none have been located on LHD facilities.

The Alaska Blackfish (*Dallia pectoralis*) and the Three-Spine Stickleback (*Gasterosteus aculeatus*) reside in some lakes in the area, and were assumed to inhabit Lakes Hood and Spenard. However, a 2011 survey performed by the Alaska Department of Fish and Game found neither of these species in the lakes at that time.

Areas around and within the airport boundary provide habitat for small mammals such as red squirrels (*Tamiasciurus hudsconicus*), coyotes (*Canis latrans*), snowshoe hares (*Lepus americaus*), ermine (*Mustela ermine*), shrews (*Soricidae*), and a variety of other small rodents. In addition, a few black bear (*Ursus americanus*) and red fox (*Vulpes vulpes*) live in forested areas near LHD. Because of the forest, shrub, and wetland areas, moose (*Alces alces*) are common year-round on the airport property.

Although most of the CIP projects would occur in developed or disturbed areas, Project 10A relocates gravel aircraft tie-downs to east of the gravel runway and would affect undeveloped land. Since this area is on the airport, adjacent to an active runway, and managed to minimize wildlife hazards to aircraft operations, the area's habitat value is low. Surveys would be conducted for eagle nests in the vicinity of CIP projects prior to commencing construction activities. To avoid disturbing nesting bald eagles, the DOT&PF, in consultation with USFWS, would maintain construction buffers around nests; and construction activities would be conducted outside of the bird nesting timeframe, using guidelines developed by the USFWS.

Construction in the lakes has the potential to introduce new invasive species to the project site on construction equipment or by importing fill containing invasive species. The invasive aquatic plant species, American waterweed (*Elodea canadensis*), was introduced into Lake Hood and Lake Spenard in 2015. Disturbance of the lake bottom due to dredging or revitalization of floatplane ramps could contribute to the introduction and spread of invasive species. Measures to control Elodea would need to be implemented during construction to minimize the potential for the spread of this invasive aquatic plant species.

CIP projects would primarily occur within previously developed areas and be expected to have minimal effects on either fish or wildlife. None of the CIP projects are anticipated to lead to a long-term or permanent loss of plant or wildlife species, cause adverse impacts to special status species or their habitats, result in a substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations; or cause an adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality, or ability to sustain a minimum population level required for population maintenance.

A Fish Habitat Permit from the State of Alaska Department of Fish and Game may be required for CIP projects 1,4,5,6, and 10A-C as construction work may occur below the ordinary high water mark of Lake Hood or Lake Spenard.

7.2.3 Climate

NEPA Significance Threshold: The FAA has not established a significance threshold for Climate.

Draft Council on Environmental Quality (CEQ) guidance affirmed the applicability of NEPA and the CEQ regulations to greenhouse gases (GHG) and climate. The CEQ guidelines ask agencies to consider two factors: the potential effects of a proposed action (as indicated by GHG emissions), and the implication of climate change for environmental effects of a proposed action. Of the six recognized GHG, only carbon dioxide is a direct product of aircraft combustion. There are no significance thresholds regarding GHG emissions, nor has the FAA identified specific factors to consider in making a significance determination for GHG emissions.

With the exception of 10C, none of the CIP projects would change the number of aircraft operations; there would be no measureable increase of GHGs. Although CIP project 10C may increase the number of lake slips available on LHD by up to 5%, this would not translate to a 5% increase in lake aircraft operations. Most private aircraft parked in lake slips have a much lower number of operations annually than commercial slips/lease areas which have numerous operations per aircraft per day. Therefore, the increase in lake slips would likely result in only a small (<5%) increase in annual operations.

7.2.4 Hazardous Materials, Solid Waste, and Pollution Prevention

NEPA Significance Threshold: The FAA has not established a significance threshold for hazardous materials, solid waste, and pollution prevention.

Factors to Consider: The action would have the potential to:

- Violate applicable Federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management;
- Involve a contaminated site (including but not limited to a site listed on the National Priorities List). Contaminated sites may encompass relatively large areas. However, not all of the grounds within the boundaries of a contaminated site are contaminated, which leaves space for siting a facility on non-contaminated land within the boundaries of a contaminated site. An EIS is not necessarily required. Paragraph 6-2.3.a of FAA Order 1050.1F allows for mitigating impacts below significant levels (e.g., modifying an action to site it on non-contaminated grounds within a contaminated site). Therefore, if appropriately mitigated, actions within the boundaries of a contaminated site would not have significant impacts;
- Produce an appreciably different quantity or type of hazardous waste;
- Generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would exceed local capacity; or
- Adversely affect human health and the environment.

Many hazardous spills have been documented over the years in the LHD area. ANC worked with LHD tenants and slip owners in the late 1990s to remove leaking underground fuel storage tanks and to remediate contamination as discussed in Section 2.8.9. Of the more than 150 contaminated sites at or near LHD listed in the State of Alaska Department of Environmental Conservation (DEC) contaminated sites database, most sites were associated with leaking underground tanks and have been remediated and closed. Only two sites on LHD are considered open sites under investigation and remediation, both sites are associated with the U.S. Department of the Interior Office of Aircraft Services site on the south side of Lake Hood. Another eight sites are closed with Institutional Controls. In addition to the contaminated sites on LHD, the contaminated sites database lists the Regal Alaskan Hotel (now the Lakefront Anchorage) as an open contaminated site adjacent to Lake Spenard.

The two sites on LHD that are considered open sites under investigation and remediation are in close proximity to proposed CIP projects 1, 2, 4, and 9, but it appears ground disturbances from CIP projects 1 and 2 would be minimal. If these CIP projects entail ground disturbance or dredging, it is possible contaminated soil or groundwater would be encountered. Any construction plans would include coordination with DEC to address procedures to follow in the event contaminated soil is encountered. DEC may require additional monitoring in this case.

CIP projects 4 and 6 are in the vicinity of the Lakefront Anchorage hotel contaminated site. If contamination from this spill did enter Lake Spenard, it is possible contaminated sediment and groundwater is still present. Coordination with DEC is recommended to determine the full extent of the contamination in this area.

None of the CIP projects are anticipated to violate any applicable federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management; produce an appreciably different quantity or type of hazardous waste; generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would exceed local capacity; or adversely affect human health and the environment.

7.2.5 Historical, Architectural, Archeological, and Cultural Resources

NEPA Significance Threshold: The FAA has not established a significance threshold for Historical, Architectural, Archeological, and Cultural Resources.

Factors to Consider: The action would result in a finding of Adverse Effect through the Section 106 process. However, an adverse effect finding does not automatically trigger preparation of an EIS (i.e., a significant impact).

Cultural resource surveys have been conducted near LHD since the 1930s. Section 106 compliance surveys, Cold War Air Defense military installation historic building and structure surveys, and Native ethnographic and historic land use studies have also been conducted in the vicinity of the airport. While cultural resource investigations have been conducted within and adjacent to the airport, it is possible undocumented cultural resources may be located on or adjacent to the airport.

As the CIP projects are further developed, the airport and FAA would be required by federal law to conduct an environmental review process under NEPA and Section 106 of the National Historic Preservation Act (NHPA). These two processes are separate, but the Section 106 process is coordinated with NEPA and contributes to its development and analysis. Consultation with the State Historic Preservation Office (SHPO), tribal governments, the airport, and other interested entities identified by them, would be required pursuant to Section 106 of the NHPA. Opportunities to avoid, minimize, and mitigate impacts resulting from airport development would be addressed in these processes.

Given that most of the CIP projects are limited to improvements to existing facilities, the potential for impacts to historic resources is reduced. Concurrence from the SHPO regarding impacts to historic resources would be required for all CIP projects. No adverse effects are anticipated to result from CIP projects.

7.2.6 Land Use

NEPA Significance Threshold: The FAA has not established a significance threshold for Land Use.

Factors to Consider: There are no specific independent factors to consider for Land Use. The determination that significant impacts exist in the Land Use impact category is normally dependent on the significance of other impacts.

All of the CIP projects listed in Table 7-1 have the potential to require a consistency review of land use and development restrictions within the project area.

The majority of the proposed CIP projects consist of maintenance and upgrade of existing airport facilities. CIP project 10A relocates some tie downs to allow for separation of taxiways and roads between the lake and the LHD gravel strip to decrease conflicts between pedestrians, vehicles and aircraft. All of these areas would continue to be airport uses. Property acquisition under CIP project 6 would result in a change from residential/commercial uses on the east shore of Lake Spenard to transportation/airport use on these parcels. Given these lots lie in a small area tucked between a hotel and the lake, this change in land use would not adversely affect any other lands.

Some of the proposed CIP projects, such as CIP projects 7 and 9 through 13, may result in a need to change lease boundaries or relocate slips or facilities. If federal funds are used for CIP projects, including property acquisition under CIP 6, the federal funding could trigger compliance with Public Law 91-646, the Uniform Relocation Assistance and Real Property Acquisition Polices Act of 1970 (Uniform Act). The Uniform Act is designed to provide for fair and equitable treatment for entities whose real property is being acquired, or who must move as a result of a project receiving federal funds. Each CIP project will need to be evaluated to determine if the project triggers the Uniform Act.

7.2.7 Natural Resources and Energy Supply

NEPA Significance Threshold: The FAA has not established a significance threshold for Natural Resources and Energy Supply.

Factors to Consider: The action would have the potential to cause demand to exceed available or future supplies of these resources.

None of the CIP projects are anticipated to require more than a minor increase in energy demands.

7.2.8 Noise and Compatible Land Use

NEPA Significance Threshold: The action would increase noise by a Day-Night Average Sound Level[17] (DNL) 1.5 decibels (dB) or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the no action alternative for the same timeframe. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB.

Factors to Consider: Special consideration needs to be given to the evaluation of the significance of noise impacts on noise sensitive areas within Section 4(f) properties (including, but not limited to, noise sensitive areas within national parks; national wildlife and waterfowl refuges; and historic sites, including traditional cultural properties) where the land use compatibility guidelines in 14 CFR Part 150 are not relevant to the value, significance, and enjoyment of the area in question. For example, the DNL 65 dB threshold does not adequately address the impacts of noise on visitors to areas within a national park or national wildlife and waterfowl refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute.

Residential areas north and east of LHD are outside the 65 DNL noise contour for 2020 identified in the ANC Part 150 Plan approved in 2015. Although these neighboring residential areas are not considered non-compatible land uses with respect to FAA noise compatibility criteria, these neighborhoods have expressed concern regarding noise impacts from LHD lake and gravel strip operations and ground noise from aircraft tie down areas. The ANC Part 150

[17] The 24-hour average sound level, in dB, for the period from midnight to midnight, obtained after the addition of ten dB to sound levels for the periods between midnight and 7 a.m., and between 10 p.m. and midnight, local time.

Plan recommended noise barrier construction between the gravel strip and the adjacent neighborhoods. The FAA did not approve this measure because the areas benefited were already compatible using Part 150 noise compatibility criteria. Therefore, federal noise mitigation funds would not be eligible for constructing a noise barrier. Additional background on airport noise can be found in Section 2.8.5.

The West Anchorage District Plan (WADP), adopted by the MOA in 2012 identifies the neighborhoods around the LHD gravel strip as focus areas for airport-neighborhood compatibility planning. The WADP proposes evaluation of a buffer between the gravel strip and adjacent neighborhoods as well evaluating parking orientation of general aviation aircraft to minimize noise in residential areas. The Anchorage Wetlands Management Plan, adopted in 2014, references a municipal ordinance AO 2000-151 (S-2) that calls for a scenic easement along the airport boundary near the gravel strip. The ordinance calls for a joint planning effort for undeveloped lands between the gravel strip and the neighborhood. The scenic easement concept document attached to the ordinance calls for the easement to be formalized under an agreement with the municipality and FAA approval. This has never occurred and there is uncertainty as to the status and validity of the ordinance stipulations.

Most of the CIP projects involve upgrades and revitalization of current airport property and are not anticipated to result in substantive changes in the aircraft operation numbers or noise levels, particularly on the gravel strip. The relocation of gravel tie-downs to the area east of the gravel runway in CIP project 10A would result in a change in the location of aircraft starts and taxiing in relation to the residential areas. This project could change noise levels in areas close to residential neighborhoods, but it is unlikely that noise levels in these areas would meet or exceed the 65 DNL criteria for land use non-compatibility.

Although CIP project 10A would not likely increase non-compatible land uses adjacent to LHD, the sensitivity of the neighborhoods to ground noise issues and relocation of aircraft tie downs closer to the neighborhoods may require additional analysis of potential effects and possible mitigation measures. In addition, the uncertainty surrounding AO 2000-151 (S-2) and the high level of community interest in development of airport facilities closer to residential areas near

Lake Hood may require additional analysis of CIP project 10A to determine whether coordination with the MOA is required and the appropriate NEPA class of action.

7.2.9 Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks

NEPA Significance Threshold: The FAA has not established a significance threshold for Socioeconomics, Environmental Justice or Children's Environmental Health.

Socioeconomics

Factors to Consider: The action would have the potential to:

- *Induce substantial economic growth in an area, either directly or indirectly (e.g., through establishing projects in an undeveloped area);*
- *Disrupt or divide the physical arrangement of an established community;*
- *Cause extensive relocation when sufficient replacement housing is unavailable;*
- *Cause extensive relocation of community businesses that would cause severe economic hardship for affected communities;*
- *Disrupt local traffic patterns and substantially reduce the levels of service of roads serving an airport and its surrounding communities; or*
- *Produce a substantial change in the community tax base.*

Continued improvements to LHD are expected to positively affect the community's economy. Population growth in Anchorage has outpaced that of Alaska and the U.S. as a whole. This growth is projected to slow due to decreases in oil revenue; however, the population of Anchorage is still expected to grow over the next decades. Historical airport operations at LHD have seen the total number of operations fluctuate since 2004; however, operations have increased from 2011 to 2014. Operations are predicted to continue to grow slowly, however none of the CIP projects, with the exception of 10C, are designed to increase capacity. CIP project 10C could increase lake slips about 5%, but this would likely result in less than a 5% change in lake operations as discussed previously.

The proposed CIP projects would improve safety and increase mobility and accessibility within the Airport. CIP projects 1, 2, 3, and 5 all involve improving Airport safety by repairing or reconstructing taxiways, floatplane ramps, and addressing other facility needs including tie downs, signage, marking, lights, and fencing.

CIP project 7 proposes to construct a parallel road and taxilane along the Commercial Finger. If this project is completed, it would increase safety by reducing potential conflicts between aircraft and automobiles. Construction of a new floatplane ramps, as proposed in CIP project 9, would increase safety and mobility by providing a safer option during certain wind conditions and reduce delays during high activity periods (e.g., when aircraft change floats, wheels, or skis).

CIP projects 10A, 10B, and 10C would construct new taxilane connectors to the fingers, relocate Runway 14-32 gravel tie downs, and provide new slips and lease areas. These proposed projects would help to increase safe access to and circulation within LHD.

None of the CIP projects are anticipated to induce substantial economic growth in an area, either directly or indirectly; disrupt or divide the physical arrangement of an established community; cause extensive relocation when sufficient replacement housing is unavailable; cause extensive relocation of community businesses that would cause severe economic hardship for affected communities; disrupt local traffic patterns and substantially reduce the levels of service of roads serving an airport and its surrounding communities; or produce a substantial change in the community tax base.

7.2.10 Environmental Justice

Factors to Consider: The action would have the potential to lead to a disproportionately high and adverse impact to an environmental justice population, i.e., a low-income or minority population, due to:

- *Significant impacts in other environmental impact categories; or*

- *Impacts on the physical or natural environment that affect an environmental justice population in a way that the FAA determines are unique to the environmental justice population and significant to that population.*

No significant impacts are expected as a result of any of the CIP projects. According to the EPA's Environmental Justice Screening and Mapping Tool (Version 2016), there is no environmental justice population (low-income or minority) adjacent to LHD. The adjacent areas have a lower percentage of low-income or minority populations when compared to the MOA or the state. A comparison of the proportion of the population of environmental justice populations between the project area (adjacent census tracts and adjacent census block groups), MOA, and state are shown in Table 7-2.

Table 7-2: Environmental Justice Populations

Geographic Area	Low Income Population (%)	Minority Population (%)
Adjacent Census Tracts	13	31
Adjacent Census Block Groups	16	31
MOA	**26**	**39**
State	**26**	**37**

Children's Environmental Health

Factors to Consider: The action would have the potential to lead to a disproportionate health or safety risk to children.

The closest schools are Lake Hood Elementary, and Northwood ABC Elementary. Lake Hood Elementary is approximately 1/3 mile from LHD and Northwood ABC Elementary is 3/4 mile from LHD. No issues related to children's safety or health has been identified by the community and none of the proposed CIP projects are expected to significantly increase the level of aircraft operations, or change noise levels.

None of the CIP projects are anticipated to result in significant impacts in other environmental impact categories or impact an environmental justice population.

7.2.11 Visual Effects (Including Light Emissions)

NEPA Significance Threshold: The FAA has not established a significance threshold for Light Emissions or Visual Resources/Visual Character.

Light Emissions

Factors to Consider: The degree to which the action would have the potential to:

- *Create annoyance or interfere with normal activities from light emissions; and*
- *Affect the visual character of the area due to the light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources.*

None of the CIP projects are anticipated to significantly increase lighting or measurably affect the visual character of the area due to light emissions.

Visual Resources/Visual Character

Factors to Consider: The extent the action would have the potential to:

- *Affect the nature of the visual character of the area, including the importance, uniqueness, and aesthetic value of the affected visual resources;*
- *Contrast with the visual resources and/or visual character in the study area; and*
- *Block or obstruct the views of visual resources, including whether these resources would still be viewable from other locations.*

The proposed CIP projects would not change the visual character of the area, contrast with the existing character of LHD, or block or obstruct any visual resources.

None of the CIP projects are anticipated to create annoyance or interfere with normal activities from light emissions; affect the visual character of the area due to the light emissions, including the importance, uniqueness, and aesthetic value of the affected visual resources.

CIP project 10A may result in a minor change of the visual character of the area as this project will convert undeveloped, vegetated land to a paved area with some overhead lighting.

7.2.12 Water Resources (Including Wetlands, Floodplains, Surface Waters, Groundwater, and Wild and Scenic Rivers)

Wetlands

NEPA Significance Threshold: *The action would:*

1. Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;

2. Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;

3. Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);

4. Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;

5. Promote development of secondary activities or services that would cause the circumstances listed above to occur; or

6. Be inconsistent with applicable state wetland strategies.

Wetlands

The Anchorage Wetlands Management Plan (AWMP) adopted by the MOA in 2014 identifies wetlands located on and near LHD. The majority of the undeveloped vegetated areas around LHD are designated wetlands. Turnagain Bog is the largest wetland area at ANC and is directly north of Lake Hood (Figure 2-3). Wetland areas have become smaller over time as LHD and the

surrounding area have been developed. The AWMP policies for Turnagain Bog reference AO 2000-151 (S-2) and call for a joint planning process for development in wetland areas on the east side of Turnagain Bog.

A U.S. Army Corps of Engineers (USACE) Section 404 permit for the placement of fill in Waters of the U.S. may occur for CIP projects 6, 8, 10A, 10B, 10C, 11, 12, and 13. With the exception of CIP project 10A, wetland impacts are anticipated to be negligible to minor and would likely qualify for a nationwide permit. CIP project 10A is anticipated to require fill in wetlands primarily designated “A” (preservation) by the MOA, and any activity that includes placement of fill in "A" wetlands requires an Individual Section 404 Permit from the USACE prior to development. Given the uncertainty regarding the applicability of AO 2000-151 (S-2) on development on Turnagain Bog, additional analysis of this project would be required to determine the appropriate NEPA class of action.

None of the CIP projects are anticipated to adversely affect a wetland’s function to protect the quality or quantity of municipal water supplies, substantially alter the hydrology needed to sustain an affected wetland system’s values and functions or those of a wetland to which it is connected; substantially reduce any affected wetland’s ability to retain floodwaters or storm runoff, adversely affect the ability of a wetland to maintain natural systems supporting wildlife and fish habitat; promote development of secondary activities or services that would cause the circumstances listed above to occur; or be inconsistent with applicable state wetland strategies.

Floodplains

NEPA Significance Threshold: *The action would cause notable adverse impacts on natural and beneficial floodplain values. Natural and beneficial floodplain values are defined in Paragraph 4.k of DOT Order 5650.2, Floodplain Management and Protection.*

Portions of LHD are located within the 100-year floodplain, particularly Lakes Hood and Spenard, and an area near the northern end of Taxiway H leading to Jones Lake and Hood Creek. CIP projects 1, 4, 5, 8, 10B, and 11 are within the 100-year floodplain. Only CIP project 4 is likely to require an MOA Flood Hazard Permit. Determining if CIP projects 1, 5, 8, 10B, or 11

would require a Flood Hazard Permit will depend on several factors (e.g., elevation of completed projects) and would likely require consultation with the MOA.

None of the CIP projects are anticipated to cause notable adverse impacts on natural and beneficial floodplain values.

Surface Waters

NEPA Significance Threshold: *The action would:*

1. Exceed water quality standards established by Federal, state, local, and tribal regulatory agencies; or

2. Contaminate public drinking water supply such that public health may be adversely affected.

Factors to Consider: The action would have the potential to:

- *Adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values;*
- *Adversely affect surface waters such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or*
- *Present difficulties based on water quality impacts when obtaining a permit or authorization.*

Past development in LHD and other areas surrounding Lakes Hood and Spenard has resulted in increased impervious surfaces resulting in more stormwater runoff, increased pollutant loads, and loss of natural vegetation to slow flows and allow for pollutants to settle out. Much of the area around Lakes Hood and Spenard is developed and paved, resulting in stormwater runoff into local lakes.

The 2014 Alaska Impaired Waters list is still awaiting EPA approval, which proposed to take Lakes Hood and Spenard off the 303(d) list for low DO[18]. Once that list is approved the lakes will no longer be considered impaired water bodies.

Several of the proposed projects would increase the amount of impermeable surface at LHD, including:

- CIP project 7 which would construct a parallel road and taxilane on the commercial finger at the north end of the Lake Hood;
- CIP project 9 which would install concrete floatplane ramps in Lake Hood over an area currently surfaced with gravel and grass;
- CIP projects 10A, 10B, and 10C, which would add paved roadways and taxiways; and
- CIP project 11 reconstructs and realigns the existing Taxiway H.

No permits from DEC would be needed as stormwater runoff would consist of sheet flow with no point sources of discharge.

Construction related to CIP projects may cause a temporary degradation of water quality. Dredging (CIP project 4) and repairing/replacing of floatplane ramps would cause a temporary degradation of water quality by increasing turbidity. Implementation of best management practices for minimizing impacts would reduce the potential for water quality effects during construction. A Storm Water Pollution Prevention Plan would be required for all earth disturbing activities.

Several of the proposed projects would add new utilities, or impact current utilities. The resurfacing/reconstruction of Taxilane V may change current storm drains and corridors. An Alaska Pollution Discharge Elimination System General Permit for Large and Small Construction Activities would be required for all projects disturbing 1.0 acre or more.

[18] Alaska Department of Environmental Conservation, Water Quality Division.

None of the CIP projects are anticipated to exceed established water quality standards; contaminate public drinking water supply such that public health may be adversely affected; adversely affect natural and beneficial water resource values to a degree that substantially diminishes or destroys such values; adversely affect surface waters such that the beneficial uses and values of such waters are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or present difficulties based on water quality impacts when obtaining a permit or authorization.

Groundwater

NEPA Significance Threshold: *The action would:*

1. Exceed groundwater quality standards established by Federal, state, local, and tribal regulatory agencies; or

2. Contaminate an aquifer used for public water supply such that public health may be adversely affected.

Factors to Consider: The action would have the potential to:

- Adversely affect natural and beneficial groundwater values to a degree that substantially diminishes or destroys such values;
- Adversely affect groundwater quantities such that the beneficial uses and values of such groundwater are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or
- Present difficulties based on water quality impacts when obtaining a permit or authorization.

None of the CIP projects are anticipated to exceed groundwater quality standards established by Federal, state, local, and tribal regulatory agencies; contaminate an aquifer used for public water supply such that public health may be adversely affected; adversely affect natural and beneficial groundwater values to a degree that substantially diminishes or destroys such values;

adversely affect groundwater quantities such that the beneficial uses and values of such groundwater are appreciably diminished or can no longer be maintained and such impairment cannot be avoided or satisfactorily mitigated; or present difficulties based on water quality impacts when obtaining a permit or authorization.

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8.0 AIRPORT LAYOUT PLAN

The purpose of the Airport Layout Plan (ALP) is show the type and location of current and future airport development and to document that future development will be built according to FAA safety and design standards. These drawings show information about airfield surfaces, airspace, land use, land ownership, wind conditions, airport buildings, leaseholders, and other information. They also include data tables with key information about airport surfaces, dimensions, and airspace obstructions. The complete FAA approved Airport Layout Plan can be found in Appendix F.

Page 18 of the ALP includes a future land use drawing. The Airport designated land uses represent the highest and best use of lands to promote a safe and efficient airport. As such the land use classifications define the primary, or preferred, land use for Airport property. However, in some cases secondary, on non-preferred, land uses may be allowed for an interim duration. Additionally, tenant or subtenant operations may encompass multiple land use classifications that differ from the primary land use classifications.

8.1 Airfield

The Airfield land use classification includes the area used for the runway, waterlane, taxiway, and taxi channel system and other paved, gravel and water areas where aircraft may taxi, takeoff or land as well as apron or floatplane slip areas where aircraft may park. It also includes land areas where airfield lighting and navigational aids (NAVAIDs) may be located.

8.2 Aircraft Aeronautical

The Aircraft Aeronautical land use classification includes Aeronautical activities which require direct aircraft access to the airfield. This land use classification includes Airport lands related to the accommodation of facilities for maintenance and storage of aircraft, aircraft parking, and flight operations.

Example facilities and activities include, but are not limited to full service fixed base operations, aircraft fuel services, condo-style aircraft hangars, air ambulance operations, and small commercial or private aircraft operations.

Uses in this classification are deemed compliant with the FAA's definition of Aeronautical use.

8.3 Future Airport Development

The Future Airport Development land use classification includes Airport land areas that are vacant or have not yet been categorized as another land use but are reserved for potential airport development.

8.4 Governmental

Governmental land use designates the land on the south side of Lake Hood used by federal and state agencies.

8.5 Land Acquisition

The Land Acquisition land use includes areas not currently owned by the Airport which may need to be acquired to support the safe and efficient operation of the Airport. Land acquired by the Airport would be classified as a specific use at the time of acquisition.

8.6 Nonaeronautical

The Nonaeronautical land use classification includes all uses of the Airport that are not used for Aeronautical purposes as previously defined. The land uses in this classification are Nonaeronautical commercial uses that are not required to be located on an airport for the businesses to operate. The maximum lease term for Nonaeronautical development is 35 years.

Areas designated as "Nonaeronautical" do not exclude aeronautical use activities; aeronautical users may lease within any area designated as nonaeronautical. An aeronautical user takes priority over a nonaeronautical user in consideration of a lease.

An example of a nonaeronautical land use is a hotel parking lot.

8.7 Other Aeronautical

The Other Aeronautical land use classification includes Airport lands related to the accommodation of facilities that do not require direct aircraft access to the airfield and lands that support of the maintenance and operations of aircraft and the Airport. Example facilities

and activities include, but are not limited to public parking facilities required to operate the Airport such as Aircraft Rescue and Firefighting, air traffic control tower, airfield maintenance, water rescue boat house, water well to maintain lake levels, airport facility maintenance, airport maintenance equipment yards, and airport material storage, and airport snow storage.

Uses in this classification are deemed compliant with the FAA's definition of Aeronautical use.

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